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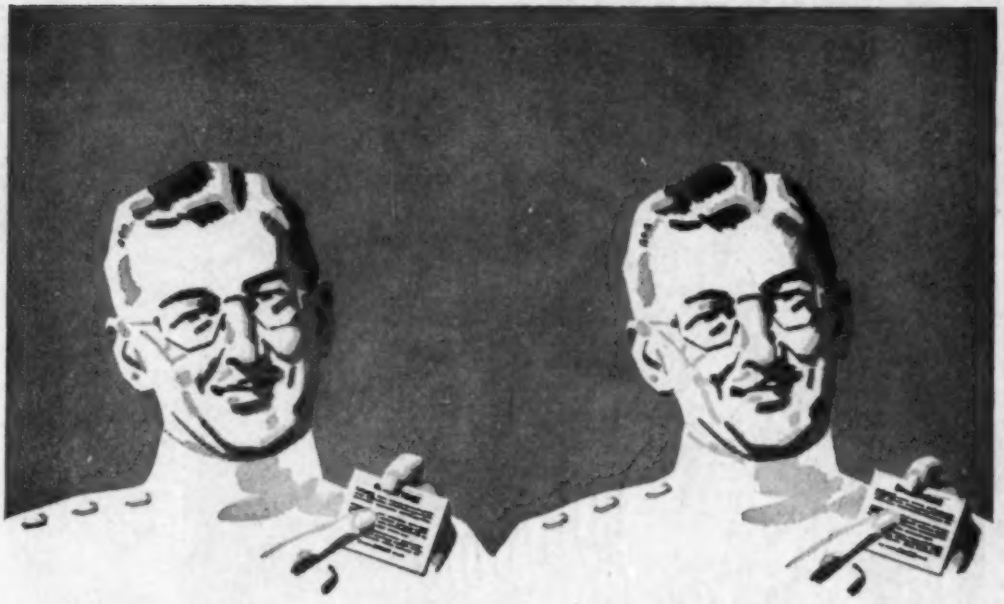

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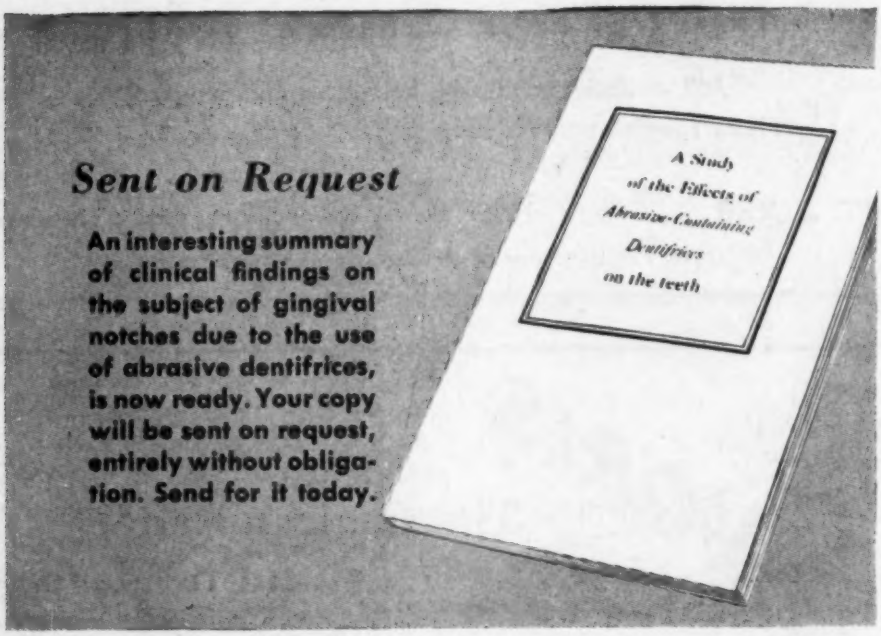
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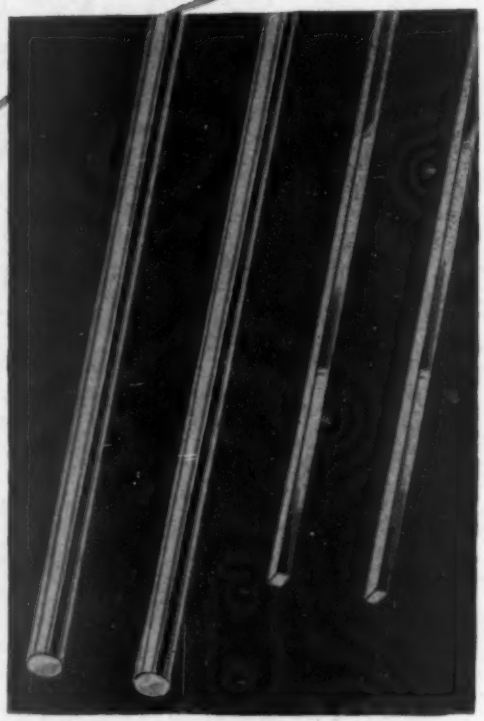

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Original Articles

THE RATIONALE OF THE LABIOLINGUAL APPLIANCES IN PRESENT-DAY ORTHODONTIC TREATMENT

OREN A. OLIVER, D.D.S., NASHVILLE, TENN.

IN ITS half-century of growth, orthodontics has made a remarkable record of achievement. Probably this record is not inferior to that of any other branch of health service. We may well be proud of ourselves and of the pioneers in our profession who came before us, but, of course, we should not become self-satisfied. If we did this, we should soon stop thinking and stop experimenting. Orthodontics would then stop developing. As we all know, this would be a calamity.

Just as a similar symposium in Chicago did not definitely settle the extraction problem, we here today cannot definitely settle appliance controversy in orthodontics. In fact, we cannot be optimistic enough to believe that we will ever definitely and completely agree on mechanical therapy. Perhaps this is for the best, for as an eminent surgeon once said, "When men smile and agree, progress weeps." As long as we can disagree and still smile, however, as we do in meetings of this type, there is every reason why our progress should be without limit. Therefore, let us continue to be filled with a divine discontent with our present-day treatment methods and by so doing continue to make rapid strides of progress, such as we have these past few years.

The paper here presented discusses and advocates the labiolingual arch therapy. May I express my sincere appreciation for the invitation to appear before this assembly to discuss this therapy which I have practiced for thirty years. It is, of course, realized that this is not entirely a personal honor, for my appearance here today is as the representative of many distinguished orthodontists throughout the country who appreciate and use the labiolingual technique. The following expressions of opinion, therefore, are not mine alone, but are the compiled, correlated opinions of many of the accomplished users of the labiolingual technique.

Read before the Southern Society of Orthodontists, Atlanta, Ga., Oct. 23, 1944.

Of course, all of us here well realize that mechanical therapy is not the sole factor when considering orthodontic problems. So that we will not be duly criticized for dwelling so completely upon appliance controversy today, let us pause and willingly admit that the biologic factors which make tooth movement possible is of equal importance to the mechanical factors which accomplish this movement.

What grief would have been ours, and how retarded our progress, had it not been for the outstanding biologic research of Ketcham, Hellman, Todd, Oppenheim, Breitner, Gottlieb, LeRoy Johnson, and others. The definite proved works of these men force us to realize that, above all, we are working on a living organism. In fact, we are working on a group of living organisms, for each tooth, in every arch, is an individual living organism. Of course, we have always realized that the fundamental purpose of orthodontic treatment is to restore these organisms to an individual, normal, functional and esthetic position. These great scientists, however, are constantly reminding us and warning us that this most certainly is not ideally and physiologically accomplished by severe, intermittent pushing, pulling, and rotating of these vital organisms, but that it is most ideally and physiologically accomplished by a gentle, stimulating pressure which treats each tooth as the individual living organism that it is.

The speaker does not believe it is desired that he dwell today in detail on the biologic aspects of orthodontic treatment, nor is it at all necessary to do so, for all capable orthodontists certainly well know and understand these biologic principles, regardless of the type of appliances they use. Yes, we all know and understand biologic principles, but do we know and understand the biologic effects of the particular appliance we use, and are we positive that their reaction is in keeping with proved biologic principles? That, Gentlemen, is the vital question. It is high time we quit matching mechanics against the biologic and match mechanics with the biologic.

The points here made are so important that two long quotations are now ventured in support of them. Dr. Milo Hellman, an unquestionable authority on biologic research, stated in a recent letter:

"Let me make it clear that I have always looked upon all sorts of gadgets in orthodontia with considerable sympathy. I am always interested to watch the experts do their best and am keenly anxious and very curious to note their results. I do not believe, however, in using every gadget myself to ascertain its efficiency. I take the experts using them at their word. But I formulate my opinion on these gadgets by the results they can produce.

"I have been clinging to a technic which is reducible to the simplest expedients. It may vary from an outfit comprising a labial arch, ligatures and other auxiliaries to no mechanism at all outside of an orangewood stick. I have never tried to produce rapid tooth movement, but I am always aiming at shortening the periods of orthodontic procedure. Comparisons of results of other orthodontists with my own bring out encouraging facts indicating that mine equal and often surpass the best that may be produced with many of the more popular appliances in use. Moreover, a reexamination of the cases that I have treated furnishes some evidence that, from a biological point of view, the procedure I have been following causes less damage to the tissues susceptible to injury than most of the cases treated by others. In my estimation, an appliance to be least harmful must, to begin with, exert slight effects upon vital tissues. Then it must also allow time between those periods of effective action, so as to enable the tissues to regenerate. Then also, the fact should be heeded that an appliance accomplishes more and does less harm during periods of normal active growth and differentiation than during periods of rest. To my knowledge little attention to such details is given in practice.

"For instance, from what I see generally being done it is obvious that fundamental principles of occlusion are now being completely ignored. Also I must say that malocclusion is often made worse after treatment than it was before, and that the harm done to the denti-

tion by recent new-fangled orthodontic treatment is alarming. On such accounts, it would seem that practices of this sort certainly do not justify orthodontic procedures by any procedure. Fortunately, studies of my own material is a source of more encouraging optimism. But I am sure that the present attitude will have to change, if a profound impression is to be made of the significance of teeth, occlusion, looks, and orthodontics."

The other man that we would like briefly to quote is Dr. Albin Oppenheim. His remarks are as follows:

"In the use of strong forces the periodontal membrane becomes crushed and its nourishment facilities cut down. As a consequence, undermining resorption sets in from various sides but not only in the direction of the intended movement. The resorption (loss) of bone is therefore limited. The osteoclasts on the periosteal side appear already after twenty-four hours, possibly even earlier. For both these osteoclasts we propose the name 'secondary osteoclasts.' They persist until the affected bone, cementum, and the crushed tissues are eliminated.

"In the use of strong forces, many vessels are ruptured on the traction side, forming hemorrhages. The corresponding impairment of the nourishment of the bone with the inevitable encroachment on the osteocytes, as well as the toxins originated by the decomposition of the red blood corpuscles, mobilize osteoclasts to work on the traction side too. This contributes to the looseness of the teeth. For these osteoclasts originating under quite strange conditions we propose the name 'tertiary osteoclasts.'

"On the pressure side, on account of impaired nourishment by the total compression and thrombosis of the vessels, the osteocytes and cementum corpuscles disintegrate and finally disappear. Structures deprived of their living elements are dead tissues, and sooner or later nature has to dispose of them.

"To avoid all these occurrences, we have so far only one means, that is to avoid a too great or too long protracted compression of the periodontal membrane.

"The stronger the force used, the greater the probability for a quick and forceful relapse. One reason for these relapses may also be too wide periodontal space at the traction side by the nondevelopment of osteoid and still enhanced by the action of osteoclasts.

"My histologic evidence would seem to prove the points: (1) That the application of light forces is correct and preferable in orthodontics. (2) Our work should be performed so as to give nature ample time for compensatory formation of osteophytes. For the same reason the osteoid on the traction side is laid down in an even layer and is of greater thickness. By the reduction of the width of the periodontal membrane and on account of the greater resistance of osteoid to resorption, the extent of an always possible relapse is greatly limited. (3) Only light forces are able to produce an abundancy of the primary osteoclasts, which alone can be considered our real helpers. They alone work without creating too great damage, if any at all. These primary osteoclasts are the principal factor in bringing about all the marvelous and revolutionary changes without clouding the prospects for the future."

Contrary to some opinions, your speaker has never claimed to have had anything to do with the origination of the labiolingual technique. But he does consider that he was among the first to recognize its potentialities, to use it extensively, and to work thoughtfully to assist in its development. One can be proud to have played even this part.

In any profession, and dentistry is fully included, if we look at its scientific aspects rather than its social aspects, there is no room for personality. There is only an impersonal search for facts. The question is, as somebody once said, "not who is right, but what is true." Your speaker hopes that he himself holds to this principle. Even while he is earnestly advocating the labiolingual therapy, he hopes that he can with a fair, open mind read or listen to any statement which presents something different. We are all engaged in an earnest search for truth. "Not who is right, but what is true."

Freely, we admit that today the labiolingual technique is not absolutely ideal, it certainly is not universal or automatic, nor even absolutely physiologic in all cases. In present-day orthodontics, there is no appliance known and used which in all respects can be scientifically classed as universal, nor is there any appliance when placed that can do the thinking, adjusting, or prove au-

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The points here made are so important that two long quotations are now ventured in support of them. Dr. Milo Hellman, an unquestionable authority on biologic research, stated in a recent letter:

"Let me make it clear that I have always looked upon all sorts of gadgets in orthodontia with considerable sympathy. I am always interested to watch the experts do their best and am keenly anxious and very curious to note their results. I do not believe, however, in using every gadget myself to ascertain its efficiency. I take the experts using them at their word. But I formulate my opinion on these gadgets by the results they can produce.

"I have been clinging to a technic which is reducible to the simplest expedients. It may vary from an outfit comprising a labial arch, ligatures and other auxiliaries to no mechanism at all outside of an orangewood stick. I have never tried to produce rapid tooth movement, but I am always aiming at shortening the periods of orthodontic procedure. Comparisons of results of other orthodontists with my own bring out encouraging facts indicating that mine equal and often surpass the best that may be produced with many of the more popular appliances in use. Moreover, a reexamination of the cases that I have treated furnishes some evidence that, from a biological point of view, the procedure I have been following causes less damage to the tissues susceptible to injury than most of the cases treated by others. In my estimation, an appliance to be least harmful must, to begin with, exert slight effects upon vital tissues. Then it must also allow time between those periods of effective action, so as to enable the tissues to regenerate. Then also, the fact should be heeded that an appliance accomplishes more and does less harm during periods of normal active growth and differentiation than during periods of rest. To my knowledge little attention to such details is given in practice.

"For instance, from what I see generally being done it is obvious that fundamental principles of occlusion are now being completely ignored. Also I must say that malocclusion is often made worse after treatment than it was before, and that the harm done to the denti-

tion by recent new-fangled orthodontic treatment is alarming. On such accounts, it would seem that practices of this sort certainly do not justify orthodontic procedures by any procedure. Fortunately, studies of my own material is a source of more encouraging optimism. But I am sure that the present attitude will have to change, if a profound impression is to be made of the significance of teeth, occlusion, looks, and orthodontics."

The other man that we would like briefly to quote is Dr. Albin Oppenheim. His remarks are as follows:

"In the use of strong forces the periodontal membrane becomes crushed and its nourishment facilities cut down. As a consequence, undermining resorption sets in from various sides but not only in the direction of the intended movement. The resorption (loss) of bone is therefore limited. The osteoclasts on the periosteal side appear already after twenty-four hours, possibly even earlier. For both these osteoclasts we propose the name 'secondary osteoclasts.' They persist until the affected bone, cementum, and the crushed tissues are eliminated.

"In the use of strong forces, many vessels are ruptured on the traction side, forming hemorrhages. The corresponding impairment of the nourishment of the bone with the inevitable encroachment on the osteocytes, as well as the toxins originated by the decomposition of the red blood corpuscles, mobilize osteoclasts to work on the traction side too. This contributes to the looseness of the teeth. For these osteoclasts originating under quite strange conditions we propose the name 'tertiary osteoclasts.'

"On the pressure side, on account of impaired nourishment by the total compression and thrombosis of the vessels, the osteocytes and cementum corpuscles disintegrate and finally disappear. Structures deprived of their living elements are dead tissues, and sooner or later nature has to dispose of them.

"To avoid all these occurrences, we have so far only one means, that is to avoid a too great or too long protracted compression of the periodontal membrane.

"The stronger the force used, the greater the probability for a quick and forceful relapse. One reason for these relapses may also be too wide periodontal space at the traction side by the nondevelopment of osteoid and still enhanced by the action of osteoclasts.

"My histologic evidence would seem to prove the points: (1) That the application of light forces is correct and preferable in orthodontics. (2) Our work should be performed so as to give nature ample time for compensatory formation of osteophytes. For the same reason the osteoid on the traction side is laid down in an even layer and is of greater thickness. By the reduction of the width of the periodontal membrane and on account of the greater resistance of osteoid to resorption, the extent of an always possible relapse is greatly limited. (3) Only light forces are able to produce an abundancy of the primary osteoclasts, which alone can be considered our real helpers. They alone work without creating too great damage, if any at all. These primary osteoclasts are the principal factor in bringing about all the marvelous and revolutionary changes without clouding the prospects for the future."

Contrary to some opinions, your speaker has never claimed to have had anything to do with the origination of the labiolingual technique. But he does consider that he was among the first to recognize its potentialities, to use it extensively, and to work thoughtfully to assist in its development. One can be proud to have played even this part.

In any profession, and dentistry is fully included, if we look at its scientific aspects rather than its social aspects, there is no room for personality. There is only an impersonal search for facts. The question is, as somebody once said, "not who is right, but what is true." Your speaker hopes that he himself holds to this principle. Even while he is earnestly advocating the labiolingual therapy, he hopes that he can with a fair, open mind read or listen to any statement which presents something different. We are all engaged in an earnest search for truth. "Not who is right, but what is true."

Freely, we admit that today the labiolingual technique is not absolutely ideal, it certainly is not universal or automatic, nor even absolutely physiologic in all cases. In present-day orthodontics, there is no appliance known and used which in all respects can be scientifically classed as universal, nor is there any appliance when placed that can do the thinking, adjusting, or prove au-

tomatic in its application. And, as all well realize, today we have no basis for determining what is absolutely physiologic for each individual. Therefore, no one should claim any appliance to be universal, automatic, or absolutely physiologic. What we claim for the labiolingual technique is that it is the most ideal appliance to use, and can be made to produce the closest to individual physiologic activity of any technique known to the science of orthodontics today.

The absolutely ideal appliance is yet to be realized. Each of us has his own ideas as to what he desires this ideal appliance to be. Until a more ideal appliance is developed, the advocates of the labiolingual technique claim that it, more closely than any other, approaches the classic standards of the ideal appliance, which are: stability and durability; ease of construction, placing, and manipulation; cleanliness; comfort and inconspicuousness; and, of course, most important of all, efficiency.

Stability of attachment is necessary so as to have dependable resistance in the anchor regions which will capably resist the force necessary to move the malposed teeth or arches. Durability, or lack of breakage, loose bands, etc., are very necessary to assure proper progress and comfort. In developing the labiolingual technique the greatest of engineering skill and ingenuity was applied in developing an appliance that would be stable and durable throughout active treatment, and yet not sacrifice the other important requirements of an ideal orthodontic appliance.

We must accept the fact that simplicity of design, as well as neatness of a compact appliance with a minimum number of bands, is the proper solution to ease of construction, placing, and manipulation. The minimum number of bands required, the ease with which the trained operator can construct the basic labial and lingual arches, and the ease with which he can also add and change auxiliary attachments, as they are needed and indicated, ranks the labiolingual technique above all others we now have in ease of construction, placing, and manipulation. These factors save considerable chair time for both patient and operator.

From a social and economic standpoint the therapy here advocated offers numerous advantages. We, as a profession, have an obligation to reach down, if we can, to the lower economic levels, in order to render orthodontic service to the largest possible number of persons. Simplicity of construction, ease of adjustments, adaptability to change, and relatively long periods between adjustments, are all factors which condition the cost of orthodontic service.

The above-mentioned factors of simplicity of design and minimum number of bands aid greatly in maintenance of proper oral hygiene. The normal factors of oral hygiene, which are saliva flow and tongue activity, act together to make the lingual appliance the most hygienic that can be used.

Even when the labial arch is used, oral hygiene can be splendid, due to the lack of multiple attachment bands and the fact that the labial arch is rarely in contact with the labial or buccal surface of any except the six anterior teeth. This contact with the six anterior teeth is a type contact which permits cleansing above, below, and even beneath the labial arch. The simplicity of design of the labial and lingual arches makes it possible to completely remove these appliances at each visit for prophylaxis, if it is necessary, without involving considerable time and discomfort to either patient or operator. These factors are most important in every case, and even more so in cases in which incidence of caries is such that orthodontic assistance might be questionable.

The factor of comfort and inconspicuousness is one which is of great con-

cern to the patient. If we have them, as we do with the labiolingual technique, the mental attitude of our patients toward their treatment is much better and we can obtain much more complete cooperation. The fact that tooth movement is usually accomplished by gentle-acting auxiliary attachments is greatly responsible for the comfort of the labiolingual technique. An additional element of comfort is, of course, the neat, compact type of appliance. Being inconspicuous as they are, they are less likely to create lip habits which often result from the endeavor of the patient to conceal unsightly appliances.

The speaker is well aware that of all the requirements of an ideal appliance, efficiency is most important. It is very obvious that no other technique can compare with the labiolingual technique as far as the previously discussed requirements of an ideal appliance are concerned. However, it requires a most thorough knowledge and understanding of biologic principles to realize that actually no other appliance can compare with it in efficiency. It is not denied that there are other equally as good mechanical appliances, but let us remember there is a decided difference between an excellent mechanical appliance and an orthodontic appliance, the difference obviously being that the activity of an orthodontic appliance must be in keeping with biologic principles and produce as closely as possible physiologic activity. It must be one that has complete control of all activating pressure so that at all times it will be possible to exert the required amount of pressure in the proper areas and in the proper direction. The labiolingual technique utilizes appliances that are so adaptable that you are assured of this type of activity. One of its greatest advantages is the fact that it is not a single appliance, but rather a group of appliances, each one individually designed to accomplish the desired result of the individual case.

No doubt you will all readily agree that each case presenting itself at your office is an individual case. True, they may roughly be placed in one of three basic classes of malocclusion, but is it not also true that each one will have its own particular variations? This is the very factor that will prevent there ever being definite treatment procedures for a certain class or type of malocclusion. And this is also the factor that will prevent there being one appliance that will treat all classes of malocclusion or even all types of one class of malocclusion. We can never stray from the fact that each person on this earth is an individual and their malocclusions are likewise. So let me repeat, that one of the greatly efficient advantages of the labiolingual technique is the fact that it is not one appliance, but a group of appliances, each one individually designed to treat each individual case.

In the treatment of each individual case there are certain basic types of development and tooth movement which are necessary. It remains for the field of diagnosis to determine which or what combinations are necessary in each individual case. These basic developments and tooth movements which are most commonly needed are: lateral development; vertical development, for correction both of open-bites and close-bites; anterior development of the maxillary and mandibular arches; retraction of the mandible; anterior movement of the mandible; retraction of the maxillary anterior segment; distal movement of the posterior teeth; and individual tooth movement, such as rotation, elongation, and depression.

There is not a one of these basic movements that the labiolingual arch technique cannot handle physiologically and altogether satisfactorily. And a great advantage is that, because of the versatility of the labiolingual technique, the operator can be in the process of correcting several different abnormalities si-

multaneously. Because of this, active treatment periods are reduced, for it is possible to overlap the retention of one abnormality over the treatment of a more resistant one. Yet each tooth involved in each particular abnormality is treated as an individual organism.

As is well known, there are two types of orthodontic pressure. One is constant and the other intermittent. There has been in the past considerable discussion as to which type of pressure is most physiologic. Some of our outstanding research men claim the intermittent pressure to be most in keeping with biologic principles. There are an equal number, however, who favor continuous pressure, if it is a gentle, stimulating pressure and not excessive. A review of the opinions of both of these groups convinces one that both types of pressure are needed and are indicated in orthodontic therapy.

There are certain indications in which intermittent pressure is definitely desirable, but on the other hand, there are also indications where constant pressure is equally as definitely called for. It falls into the field of experienced diagnosis to determine which and where each kind is indicated. To make such an accurate diagnosis one must be thoroughly schooled in the science of growth and development, both normal and abnormal. He who is not had better not attempt orthodontic treatment at all. Since there are definite indications for both constant and intermittent pressure, no appliance can be classified as efficient unless it can capably produce both of these types of pressure. The users of the labiolingual technique have the decided advantages of having at their command both constant and intermittent pressure. In fact, we can apply constant pressure to certain teeth or segments, while at the same time in the same or opposing arch, we can apply intermittent pressure to individual teeth or segments. Can any other appliance produce such accurate control of activating pressure?

Just as there are two types of orthodontic pressure, there are also two types of orthodontic treatment. Some men have classified them as fast treatment or slow treatment. This is, however, quite incorrect. There is no such thing as a fast tooth-moving appliance or a slow tooth-moving appliance. The rapidity of tooth movement is in direct proportion to pressure applied and the ability of the organism to react to this pressure. A more scientific classification of the types of orthodontic treatment is to consider them to be either continuous or intermittent. Continuous orthodontic treatment is that in which treatment for the case is carried from beginning to completion in one stage. There are no rest periods. There is no advantage taken of natural growth and development. It is purely a mechanical procedure, the teeth being moved toward supposedly more normal positions by a definite mechanical pressure.

This is the type of orthodontic treatment considered to be necessary in patients in their teens who have completed most of their normal facial growth and development and have present the complete permanent dentition. This type of orthodontic treatment is entirely corrective, since it is applied too late for orthodontics to aid in the prevention of a developing malocclusion. With the labiolingual technique we can render this type of treatment as capably and more physiologically than with any other.

In the past this type of treatment was the most common because it was then the accepted opinion of dentists, parents, and orthodontists that no case of malocclusion should be treated until the completion of the permanent dentition. Today we are greatly embarrassed to realize how very wrong we were. We all realize today that often the prognosis for treatment of a teen-age patient with

a completed permanent dentition is none too favorable. This being accepted, one school of thought has returned to the extraction of premolar teeth in these underdeveloped arches to obtain space to more esthetically align the anterior segments. It is not our present intent to criticize extraction, for in some of these cases compromise procedure is the only way out. What we do oppose is the opinion that the full potentialities of growth and development cannot be stimulated by orthodontic therapy and that treatment should be delayed until the completion of the permanent dentition, at which time it is so often necessary to sacrifice these premolars. This is not the opinion of men who know, understand, and capably use the labiolingual technique for intermittent treatment. These men know from actual experience in the treatment of thousands of cases a year that the full potentialities of growth and development can be stimulated by the labiolingual technique and that by so doing many of these compromise cases can be prevented.

Intermittent treatment has a definite place in orthodontic therapy. In fact, we must realize that it is by this approach that our greatest progress in orthodontic therapy is probably to be made. Let us approach this problem from a common-sense standpoint. When we notice a definite malocclusion in the mixed or even in the complete deciduous dentition, we know that this case will continue to proceed along the lines of abnormal development because the existing malocclusion presents definite inhibitory factors to normal development. This being true, is it not wise to treat this case immediately, the fundamental purpose being to remove the inhibitory factor and allow the development to continue normally? Your speaker thinks it is, and this opinion seems to be strongly substantiated.

In the deciduous dentition there are certain definite indications for orthodontic treatment. Among them are: definite cross-bite, either unilateral or bilateral; cases in which we find the maxillary anterior teeth in lingual version to the lowers; and cases in which there are extremely narrow arches and a decided distoclusion. These types of cases, we know, have no possible chance of improvement through natural growth tendencies, but rather are conditions which will get progressively worse and will interfere greatly with Nature's attempt at normal development. Can any man who sincerely considers his patients' future health and happiness deny that these are indications for immediate orthodontic therapy? Yet, can one imagine these cases being treated by a multiple banding technique? Of course not. There is but one ideal, practical therapeutic approach to the malformation of the deciduous dentition. That is with the easily constructed, inconspicuous, comfortable, and physiologically acting labiolingual technique.

No one can conscientiously deny that these same indications and others should definitely receive their initial stage of treatment in the mixed dentition, if first noticed there. It is not our purpose here to go into a detailed discussion of these indications, but this assembly knows them well. Orthodontists are confronted with them every day. Is there any orthodontic technique which is more indicated or can more successfully treat cases in the mixed dentition classification than the labiolingual technique?

When we speak of treatment of this type of case, we do not refer to definite, positive tooth positioning to a supposedly predetermined ideal arch form, or even to an arch form which we think is best for that particular individual. Rather we refer to treatment that is a stimulus and a director of segments of arches or of complete arches or of individual teeth into paths of normal growth

and development. We refer to treatment which allows individual teeth to assume spontaneously their normal position as various inhibitory factors are removed. This action can take place with the labiolingual technique because the individual teeth are not held firmly or rigidly enough to interfere with normal individual tooth movement.

We refer to treatment that does not interfere with normal individual movement of each tooth during the process of mastication, but rather allows normal functional stimulation to the surrounding tissues, thus maintaining at all times normal tissue tone. We refer to treatment in which appliances are used at intervals throughout the patient's natural growth periods, producing changes at the same time when they can and should be produced, with frequent periods during which appliances are removed in order to allow natural adaptation of the tissues to the new positions of the teeth. With this type of treatment, not only are we correcting a definite malocclusion which existed at an early age, but we have also prevented that existing malocclusion from interfering with normal growth and development, and have thus prevented it from becoming progressively more complicated. If we fail to take advantage of intermittent treatment of deciduous and mixed denture cases, we refuse to approach the ultimate goal of all medicine and dentistry, which is prevention.

Your speaker does not feel that he has digressed from our subject by discussing briefly treatment of deciduous and mixed denture cases. He believes that the greatest service orthodontic treatment can render is probably in the treatment of these cases. Consequently he feels that an outstanding point of efficiency of the labiolingual technique is the manner in which it lends itself ideally to such cases. The speaker cannot visualize appliances which positively dictate the direction and extent of tooth movement as being used in deciduous and mixed denture cases, for these appliances are most difficult to keep under absolute control and in harmony with biologic and physiologic principles, even in the treatment of complete permanent dentitions.

We should always adapt therapeutics to biologic fact and make every effort to use appliances that will do what is needed and at the same time will be safe and dependable in their application to vital, growing tissue. We should prefer always to use appliances which are capable of assisting, supplementing and guiding the developmental tendencies of the individual case, for we are not qualified to predetermine arch form consistently with inherent growth in every case.

We cannot dispute the statement made several years ago by Dr. W. W. Woodberry, "In the long run Nature takes charge of every case." So why try to take the case completely out of the hands of Nature to begin with? Nor can we dispute the statement of Dr. John V. Mershon, "We can mechanically move teeth where we think they belong, but Nature will move them to where they best adapt themselves to the rest of the organism." Therefore, why not let the entire organism be an assisting factor in the original positioning of teeth. These things we do with the labiolingual technique. In my opinion the statements of these two men are but reminders that we cannot expect permanency of result if we ignore the basic forces of occlusion and retention.

Your speaker is well aware that there are those who doubt the merits and the many advantages claimed for the labial and lingual appliances. These would have their doubts removed, he thinks, if they would study the fundamentals and put forth painstaking efforts and thought in mastering the principles. Most of

the criticism of the labiolingual methods of treatment seems to be due to the failure to understand the principles and the operative technique. To apply any idea or principle successfully, one must of necessity have a thorough knowledge of both the elementary and advanced subject matter pertaining to it. The use of the labiolingual appliance is not new in orthodontics; there are no mysteries in their use. Nor are they so complex or intricate in construction or manipulation that a student of orthodontics cannot obtain a full understanding and use of them.

Every highly regarded school of thought in our specialty today basically employs the principles of the labiolingual technique to some degree. As your speaker sees it, the farther one departs from this technique, the farther one departs from the most dependable manner in which, with our present knowledge, appliances may be employed.

Our specialty has suffered greatly from swinging in a pendulum-like manner from one treatment method to another. One often admires the application of, and end result gained by, the use of a certain appliance by a particular individual, but too often finds that other practitioners cannot get the same results with it. Years of experience in trial and error diagnosis accompanied by natural inherent personal capacities have gone into one orthodontist's services in contrast to another's. There seems to be nothing, however, in the labiolingual technique which cannot be generalized to all conscientious orthodontists.

In summarizing, let me say that those of us who use the labial and lingual appliances, with their numerous auxiliary spring attachments, and the occlusal guide plane, do so because we sincerely and conscientiously believe that they, more than any other appliance, approach the classic standards of the ideal appliance, which are: stability and durability; ease of construction; ease of placing and manipulation; cleanliness; comfort; inconspicuousness; and efficiency.

We believe in their efficiency because we can obtain any basic tooth movement and feel that we can do so more physiologically than with any other type of appliance. In addition to individual tooth movement, we can stimulate and direct the growth of entire segments or complete arches and do this more physiologically than with any other appliance. We are able to produce either constant or intermittent pressure, whichever is indicated in any particular instance. We can treat completed permanent dentitions as capably as with any other appliance, and we have a decided advantage in the treatment of deciduous and mixed denture cases.

We feel that a great advantage of the labiolingual technique is that we do not have rigid, fixed attachments to the teeth, promoting unknown directional changes in the applied force. We believe that all our treatment procedures approach more closely than any other to being physiologic and in keeping with proved biologic principles, at all times working with and not against natural growth and developmental tendencies or the six basic forces of occlusion.

Let us continue to push forward in knowledge and truth, so that boys and girls, men and women, may gain and maintain through us good health, pleasing appearance, and the happiness that comes with these qualities. In the benefits accomplished by them, the appliances have shown beyond a doubt that they fully merit the place they have achieved and now hold. May we all of us become better students and, because of this, be more charitable toward each other, even when current theories and beliefs differ.

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MEDICAL ARTS BUILDING

PREVENTION AND TREATMENT OF ORAL DISEASES OF ADULTS BY ORTHODONTIC MEANS*

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AS IN all spheres of medicine, in orthodontics too, considerable importance is attached to prophylaxis and early treatment. Timely prophylaxis often averts severe malformation of the jaw, and early treatment renders a cure possible in the initial stages when it is more economical and takes far less time. In many cases, however, anomalies are brought to the attention of the specialist in orthodontics when they are already in an advanced and aggravated stage, and manifest all the consequences resulting from abnormal functioning.

The general practitioner of dentistry, unlike the specialist in orthodontics, is very often in a position to observe anomalies in their earliest beginnings, while still undeveloped. It is therefore his duty to acquaint himself with the principles of orthodontics, namely, the normal development of the teeth and their proper occlusion. He would then be able to determine which patients should be referred to the specialist in orthodontics at the outset of the formation of an anomaly, before it has already had an opportunity to develop.

We are concerned here with dentofacial abnormalities of adults due to malocclusion and malposition of teeth which, when untreated, give rise to diseases. Our task will be to show how the resulting pathosis can be counteracted by orthodontic methods.

When a tooth is in malocclusion in relation to the alignment of the denture as a whole (extraversion), the result is tipping and perverted axial position, leading eventually to loosening.

When a tooth is in malocclusion within the dental arch (rotation or cusp-to-cusp occlusion), excessive strain is exerted both on the tooth and the surrounding tissues, resulting in traumatic occlusion.

Black found, after investigation of a thousand cases, that the average pressure exercised by a molar amounts to 171 pounds! Obviously such stress must, if misdirected, be pathogenic. Physiologic stresses are borne without inconvenience by a healthy jaw. According to Sorrin, few people have sufficient resistance to withstand the consequences of malocclusion for an indefinite period. The usual result is the breakdown of the supporting tissues of the teeth sooner or later, unless the traumatic occlusion is corrected in time.

Orthodontic treatment is based on the known phenomenon of bone apposition and bone resorption. These processes are continuous through life. Gottlieb used to say that men get up every morning with a new skeleton. There is therefore no reason to confine orthodontic treatment to any particular age above which a denture is not susceptible to correction.

In the course of an extensive practice, exclusively orthodontic, in the Palestine Workers' Sick Fund Dental Clinic, and an orthodontic and general dental private practice, I had the opportunity of combining these usually distinct branches of dental work. This has proved particularly valuable from the

*Read before the Palestine Dental Conference in Tel Aviv.

orthodontic point of view. It has taught me that orthodontics *for adults* should not be regarded as useful only from an esthetic point of view, but that such treatment is often essential in cases of pyorrhea alveolaris, marked caries, susceptibility to caries, and certain disturbances in the temporomandibular joint. In the latter case, orthodontics has an auxillary therapeutic character. It is also indispensable as a preliminary to technical replacement, as in cases of reduced and deep bite. In most cases, several factors which indicate orthodontic treatment are at work simultaneously.

It is indeed discouraging to encounter so many cases where pyorrhea, for example, associated with pathologic stress in certain areas of the denture or malocclusion, has been treated surgically or in a routine manner medically, despite the fact that it results in only a temporary remedy. In such cases the fact must be faced that this disease constantly recurs in the same and often even in an aggravated form, with the consequence that, slowly but surely, good teeth are prematurely lost. Preliminary orthodontic treatment would undoubtedly have effected a complete and lasting cure if applied at the proper time. Moreover, there are cases, only too common, in which splendid expensive bridges have proved a failure because the benefit of orthodontics has not been made use of. In these cases, the pathologic conditions were not eliminated prior to the construction of the bridge but were merely fixed by leaving them unattended.

The first point to clear up, therefore, when examining a faulty denture, is whether there are any known causes, such as abnormal vertical or sagittal relations, excessive stress, or mutilated occlusion on account of missing teeth, or whether the cause is to be sought elsewhere, such as in constitutional factors, hormonal secretion, diabetes, etc.

Let us consider the first possibility, i.e., injury due to mechanical causes. In such cases the same devices are used in the orthodontic treatment of adults as for children, namely:

Appliances Known Hitherto

1. Plates for raising and shifting the bite and for expansion.

2. Lingual or labial arches for movement of teeth, singly or in groups, and for expansion. In cases of sagittal anomalies (Class II and III malocclusion), the appliances are provided with hooks for intermaxillary elastics.

3. Various appliances, such as the band appliance for shifting a single tooth, the metallic inclined plane in simple cases of cross-bite, the diastema appliance, the chin cap, etc., or diverse combinations of the above devices.

New Appliances

4. A one-sided splint in the mandible, made of soft metal, for raising the bite in a biologic manner and for slight mesial movement of the mandible.

5. A combination of splint and arch for treatment of Class III malocclusion.

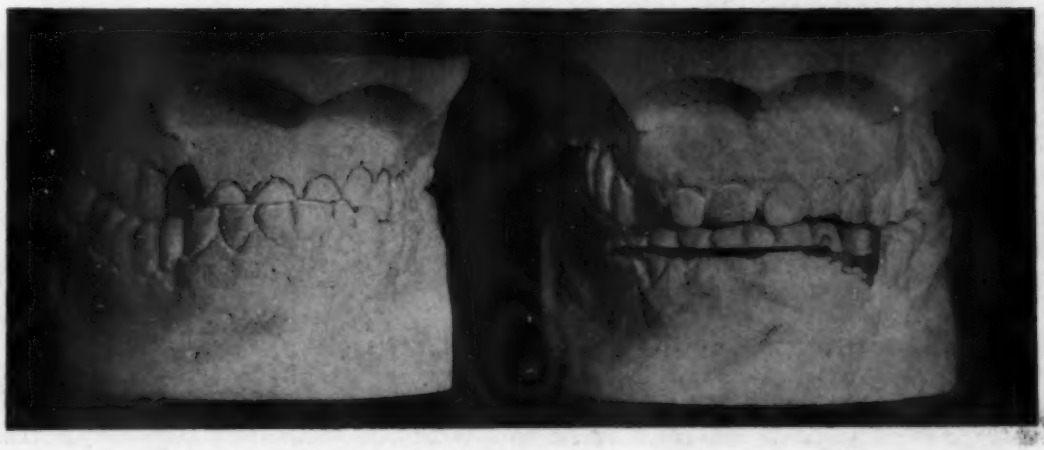
CASE REPORTS

A. Mesial Occlusion (Class III Malocclusion).—CASE 1.—The patient was a man, aged 42 years. Diagnosis: Mesial occlusion with severe protruding, elongated, and loosened anterior teeth in the mandible. The similarly loosened and partly abraded maxillary anterior teeth showed a deep brownish discoloration on their labial surface where the enamel had eroded. The patient was conscious of this disfigurement and always covered his mouth with his hand when he spoke or laughed. For these reasons I decided to apply orthodontic treatment.

Therapy: A lingual arch with auxiliary springs for lateral expansion and protrusion of the anterior teeth was inserted in the maxilla. On the buccal side of the molar bands,

hooks were provided for the use of intermaxillary elastics. In the right side of the mandible a splint was applied with a buccal tube from which a labial arch ran to the banded left lower molar provided with a lingual bar, stretching as far as the canine. Hooks for intermaxillary elastics were soldered to both sides of the appliance. This appliance was used for raising the bite, for retraction of the anterior teeth, and for correction of Class III malocclusion. The treatment was completed by the use of intermaxillary elastics worn at night only, and lasted for half a year, but the appliances were retained for a further six months. After normal occlusion had been established, the discoloration of the maxillary anterior teeth began to disappear without any special treatment, and the teeth became firm. (Fig. 1, *A* and *B*.) The orthodontic treatment resulted in a cosmetic success as well as in general rehabilitation of the denture. The patient continued under observation for six years.

A. Fig. 1. *B.*



A. Fig. 2. *B.*

CASE 2.—Orthodontics combined with prosthetics: The patient was a man, aged 32 years. Diagnosis: Mesial occlusion, missing lateral teeth.

Treatment: Orthodontic treatment as described in Case 1, combined with bridgework after raising the bite. (Fig. 2, *A* and *B*.) Fig 2, *B* shows appliance in place. I use this method of treatment successfully in all cases of Class III malocclusion.

CASE 3.—Treatment for pyorrhea alveolaris: The patient was a woman, aged 40 years. Diagnosis: Perceptibly increasing mobility of the anterior teeth, inflammation of the gums, pain, and diminished masticatory efficiency. The patient was in a state of mental depression from constant fear of losing her teeth.

Treatment consisted in selective grinding of the anterior teeth, adjusting a chin cap, which was worn for four months at night, and raising and securing the bite with lateral

bridges. (Fig. 3, *A* and *B*.) The occlusion was stabilized and the anterior teeth became completely firm. The patient has been under observation for nine years without relapse.

B. Distal Occlusion (Class II Malocclusion).—CASE 4.—The patient was a man, aged 31 years. Diagnosis: Severe maxillary anterior protrusion showing extreme overbite and distoclusion. The anterior teeth were loosened, the gums inflamed, and there were deep pockets. The denture showed all signs of pyorrhea alveolaris in a progressive state. The sagittal distance between the upper and lower anterior teeth was 16 mm. The patient suffered considerable mental distress from this disfigurement.

Treatment: The treatment in the maxilla was carried out with a vulcanite plate provided with a labial wire to retract the anterior teeth and with an inclined plane to raise the bite and to depress the anterior teeth in the mandible. In the latter, an appliance for the use of intermaxillary elastics was inserted to correct the Class II malocclusion. The treatment lasted for approximately one year. The plate continued to be worn for retention at night for another year. (Fig. 4, *A* and *B*.) After the normal occlusion had been reached, the gingival inflammation subsided and the patient's general appearance improved considerably. He has been under observation for seven years.

A. Fig. 3. *B.*

A. Fig. 4. *B.*

CASE 5.—The patient was a woman, aged 26 years. Diagnosis: The anomaly consisted in a marked facial deformity, in a strong contraction of both arches, the lower one being also badly deformed, as well as in a deep overbite and distoclusion (Class II malocclusion). The curve of Spee was disturbed. The result was diffuse atrophy, fan-shaped spacing and protrusion of the maxillary anterior teeth, as well as severe gingival inflammation on the palatal side. The lower anterior teeth were biting into the soft tissue, making mastication an agony. The teeth were very loose and there was little hope of preserving them by routine methods.

Treatment: A vulcanite expansion and bite plate provided with a labial wire was inserted for lateral expansion, retraction and closing the space of the anterior teeth, raising the bite to the desired height, and correcting the curve of Spee.

An expansion arch provided with hooks for the use of intermaxillary elastics was inserted in the mandible and worn during the course of treatment. (Fig. 5, *A*, *B*, *C*, and *D*.) In this case orthodontic therapy alone brought about complete cure of the pyorrhea alveolaris. The treatment lasted for about one year with a further year for retention.

CASE 6.—The patient was a man, aged 40 years. Diagnosis: Genuine close-bite. The patient had suffered from pyorrhea alveolaris for years. The usual therapy (oxygen, paraffin, grinding) had been applied systematically for a long period. At last the patient began to suffer severe pain in the temporomandibular joint which had been overburdened by the lowered bite (Costen's syndrome).

Treatment: A few days after the construction of a metal splint for one side of the mandible, to raise and shift the bite, the pain ceased. The patient is still under observation after seven years, during which period there has been no relapse.

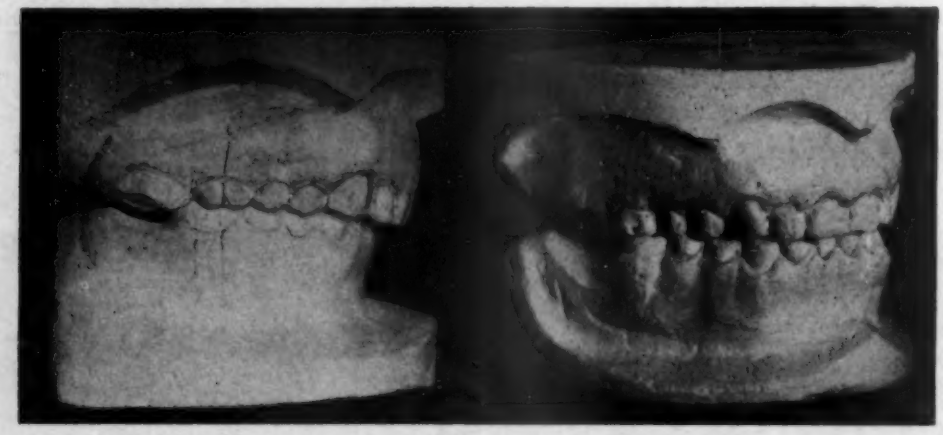
A. *B.*

C. Fig. 5. *D.*

CASE 7.—The patient was a man, aged 45 years. Diagnosis: Genuine close-bite, deep bite, and distoclusion. Conditions were the same as in Case 6. The patient suffered from sensitiveness to cold and chronic gingivitis. Previously, he had undergone treatment of the gums for years, followed by crowning of several teeth without any effect on the sensitiveness or any improvement of the gums.

Treatment: An expansion bite plate with bite block was inserted for raising the bite. This appliance was worn at night only. After about six months, the normal function of the teeth was re-established, and the pain gradually ceased. Casts before and after treatment are shown in Fig. 6, *A* and *B*.

C. Arthritis.—CASE 8.—The patient was a man, aged 32 years. Diagnosis: Deep bite and strong deviation of the midline toward the right side. Arthritis of the temporo-mandibular joint and noise in the ear.



A. Fig. 6. *B.*

A. Fig. 7. *B.*

A. Fig. 8. *B.*

Treatment: Raising of the bite and correction of the deviation with the help of a splint placed on the right side of the mandible. Pains ceased almost at once. Retention by bridgework. Casts before and after treatment are shown in Fig. 7, *A* and *B*.

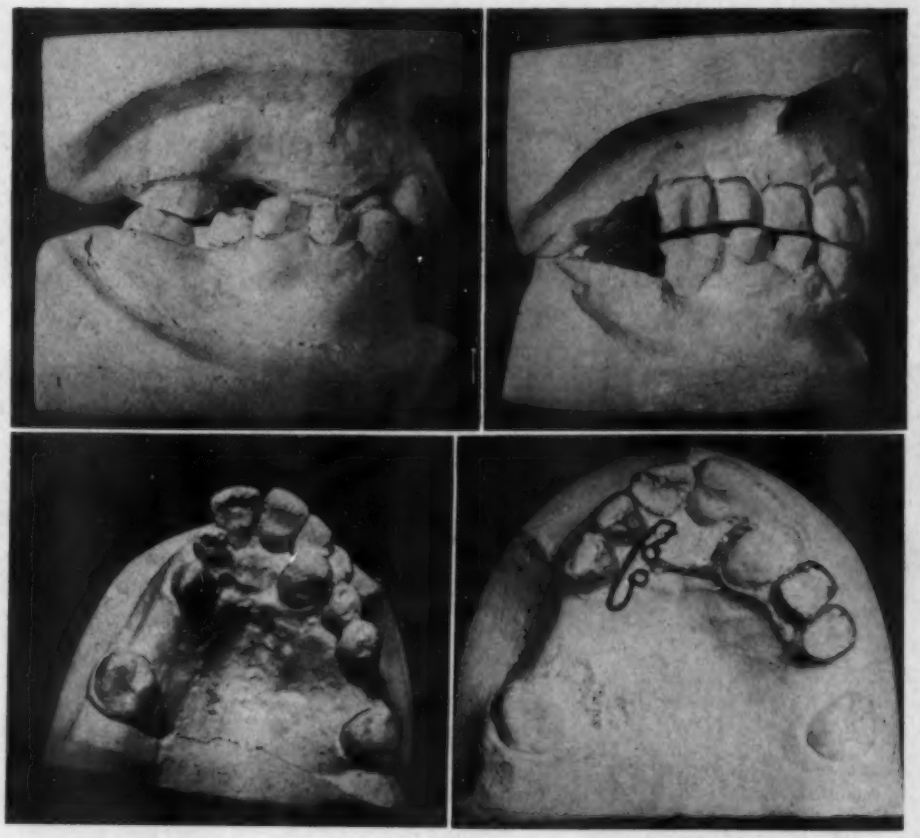
D. Caries.—CASE 9.—The patient was a woman, aged 38 years. Diagnosis: Crowded teeth, deep bite. The patient had suffered for a long time from a strong tendency to caries with increasing violent attacks of pain, though she was not able to point to a single tooth as

being the definite source of the trouble. The pains usually came at night, indicating general dental hyperemia.

Treatment: Raising of the bite with a one-sided splint. The relief thus provided freed the patient from pain and also from the tendency to active caries. The treatment lasted five months. Models at the beginning and end of treatment are shown in Fig. 8, *A* and *B*.

The symptoms which were observed in this typical case correspond to the experience according to which mechanical factors contribute to the process of caries. Deep bite and crowded teeth hinder the proper nutrition of the teeth and weaken their organic parts. Thus the enamel prism, deprived of sufficient dental support, and exposed at the same time to abnormal pressure, cracks, and the organic parts of the teeth became liable to direct influence of the saliva (acid action).

A. *B.*



C. Fig. 9. *D.*

E. Prosthetics.—CASE 10.—The patient was a man, aged 29 years. Diagnosis: Extremely crowded teeth and mutilated bite. Both canines in the maxilla erupted in complete linguoversion. Missing teeth $\frac{654 \mid 26}{86 \mid 7}$. Crossbite on the right side. The teeth were loosened and the gums inflamed.

Treatment: A special appliance inserted in the maxilla protruded the canines. At the same time a one-sided splint in the mandible unlocked the bite. The treatment was completed with bridgework that included the regulated teeth and served at the same time for retention. The orthodontic treatment lasted seven months. Four models are shown, Fig. 9, *A*, *B*, *C*, and *D*, the latter with appliance in place.

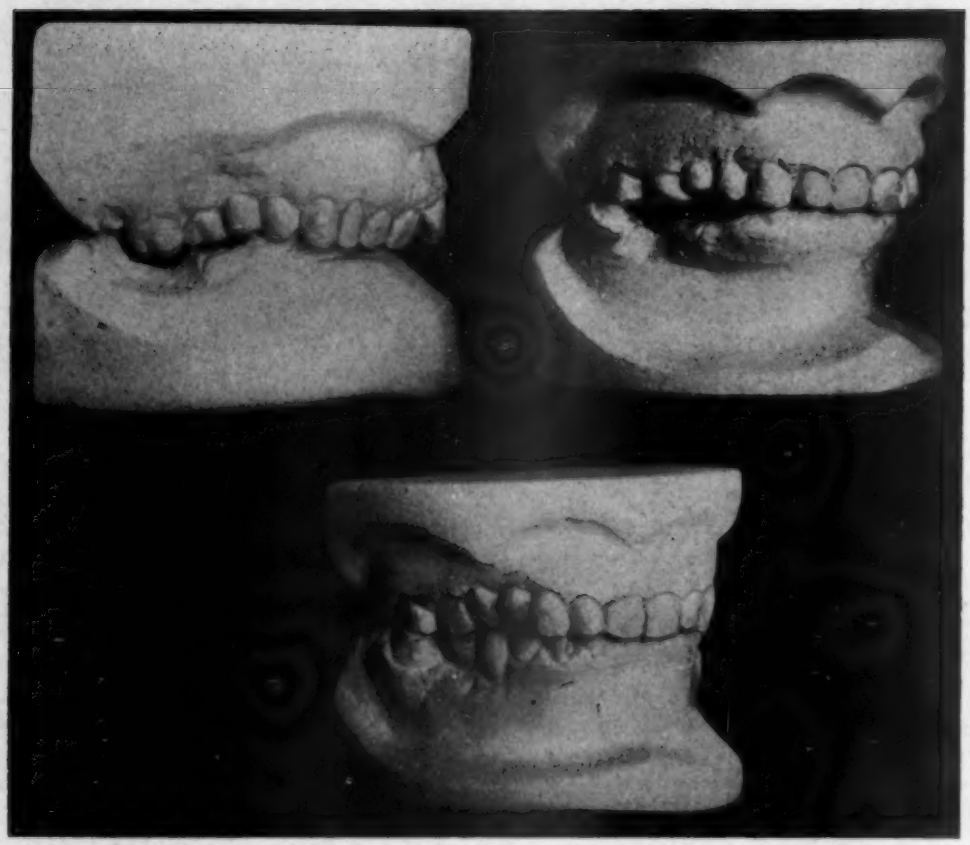
CASE 11.—The patient was a woman, aged 32 years. Diagnosis: The lower left first and second molars were missing. The third molar was partially impacted, hindered in eruption by its antagonist. The bite was lowered to such an extent that the upper molars touched the mandibular alveolar ridge. Replacement was necessary owing to gum inflammation.

Therapy: A metal splint was inserted in the lower left side to depress the upper molars to their correct position. The bridge was made after the removal of the splint and the

complete eruption of the wisdom tooth. The gum inflammation ceased. From the very first day, the bridge proved comfortable to the patient. Two models are shown (Fig. 10, *A* and *B*).

CASE 12.—The patient was a woman, aged 35 years. Diagnosis: Genuine close-bite and distoclusion. The anterior teeth were decayed. On the lateral sides the following teeth were missing: $\frac{\text{| } 58}{765 \text{ | } 56}$. The extreme distoclusion resulted in an unpleasing appearance, the chin being underdeveloped and strongly retruded.

A. Fig. 10. *B.*



A. *B.*

Fig. 11. *C.*

Treatment: A lingual arch was inserted in the upper jaw for the proper alignment of the anterior teeth, and a left lower splint for raising of the bite. Thus it became possible to make a bridge in the right side of the mandible. The treatment lasted ten months. General appearance was greatly improved Fig. 11, *A*, *B*, and *C*.)

SUMMARY

Cases have been described where the routine methods of treatment have failed. It goes without saying that dentures, when their function is disturbed, may be in need of several different kinds of treatment. The cause is the actual anomaly, while the manifestations may be, according to the predisposition, pyorrhea alveolaris, rampant caries, or affections of the temporo-mandibular joint. Other manifestations may take the form of reduced and mutilated dentures, in which case no ordinary arrangement, such as bridges or partial dentures, is any longer possible. Without causal therapeutic treatment, relapses or other failures may result. The rehabilitation and correction of the denture can be achieved only by means of initial orthodontic treatment as indicated in each individual case. Thus, orthodontic treatment in adults is indicated not only in cases of disfigurements of an esthetic nature but also in cases of diseases as described above.

I should like to emphasize particularly that the cases reported here, which represent only a small part of similar cases treated by me, were successfully treated six years or more ago, and all still under observation. In this period there has been no relapse.

CONCLUSIONS

1. The denture must be considered as a whole, and, as in all diseases, the cause or causes of the manifestation must first be ascertained.

2. It must be borne in mind that excessive or misdirected stress in connection with pathologic changes in the teeth and their surrounding tissues is of paramount importance.

3. Teeth which are overstressed must be ground if necessary. Crowded condition of teeth can be corrected by expansion. Deep bite or a bite lowered through missing teeth can be restored to proper height by orthodontic methods, by means of prosthetics, or by a combination of these methods.

4. It is biologically wrong to heighten teeth which have been hindered in their proper eruption by deep bite or some other cause, by means of crowns or inlays. Such submerged teeth must first be given the opportunity to erupt by means of orthodontic treatment.

5. Practically speaking, there is no upward limit of age beyond which orthodontic treatment is impossible.

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25 BIALIK ST.

TWO CASES REQUIRING BILATERAL MAXILLARY DISTAL MOVEMENT

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MALOCCLUSIONS in which there has been a bimaxillary forward drift of the posterior teeth provide one of the most difficult types of cases to treat orthodontically. Usually the upper canines are completely locked out (Fig. 1). When this condition is accompanied by a similar forward movement of the posterior teeth in the mandible, the difficulties of establishing normal occlusion and a pleasing facial contour are even greater. The first type of malocclusion simulates the characteristics of the so-called Class II, Division 2 (Angle), while the latter resembles the Class I malocclusion (Angle). The difficulty in treatment is one of anchorage. In the first type of case, since the mandibular teeth, especially the incisors, are well placed on basal bone, the chances of maintaining their position when using Class II elastics are good. In the second type of malocclusion we are liable to aggravate the unfavorable position of the mandibular teeth when Class II elastics are used. In the latter type of case some orthodontists[1] advocate the removal of two or more dental units in an effort to avoid winding up with a bimaxillary protrusion.

Fig. 1.—A case of bimaxillary forward drift of the posterior teeth.

CASE 1.—The patient, a boy aged 13 years, was in good health, 10 pounds underweight and rather tall for his age. He was subject to the usual childhood diseases. The lower left first molar had been extracted six months previously due to a periapical abscess, and the customary tipping and drifting of adjacent teeth followed.

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An examination of the casts (Fig. 1) shows a bilateral maxillary forward drift of all the posterior teeth, accompanied by a complete locking out of both canines. The upper anterior teeth are retruded and cover the lower anterior teeth to their gingival margins. The lower arch shows a deficiency in the vertical height of the posterior teeth, which is a contributing factor in the deep anterior overbite. There is also a lack of correspondence in the center line of the upper and lower arches. This is due to a shift of the mandible to the left. In appearance, the casts simulate a Class II, Division 2 malocclusion (Angle).

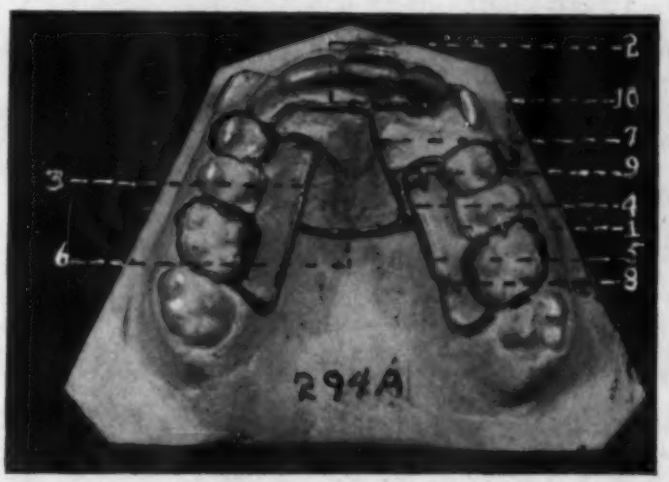

Fig. 2.—Occlusal view of appliance at the completion of distal movement on left side. *1* is 0.028 inch stabilizer joining premolar and molar; *2* is 0.040 inch heavy wire soldered from anterior bands to right first premolar; this is part of resistance unit; *3* is 0.040 inch curved wire soldered to first premolar and first molar, which forms the other part of the resistance unit; *4* is same curved 0.040 inch wire on left side. Before curving this wire a ¼ inch round tube (*5*) is slipped on. With the free-sliding tube as far back as possible, solder it on its mesial end to a palatal wire, *6*. This palatal wire is joined on its other end to the curved bar on the right side. As a further aid in anchorage, solder a crosspiece (7) from the anterior wire to palatal wire. The soldering of the intermaxillary hooks completes the appliance. One goes on the distal end of the tube (*8*) and the other goes on the anterior part of the curved wire (*9*). An additional intermaxillary hook (*10*) is soldered on the buccal aspect of the left first premolar band. This book provides additional intermaxillary pull from the mandible—a plain labial wire being sufficient for this purpose.

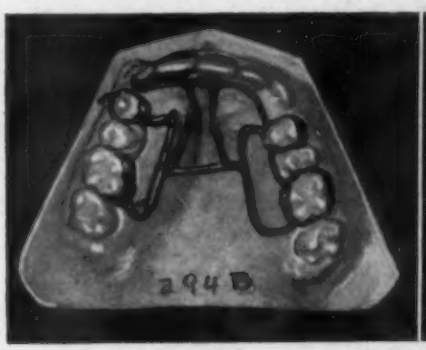

Fig. 3.

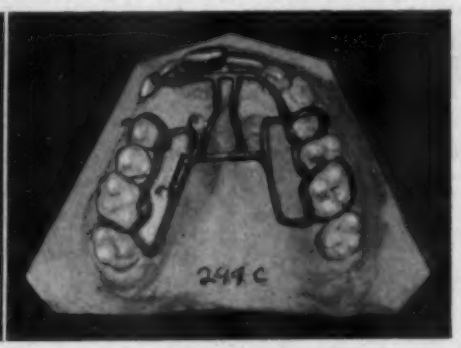

Fig. 4.

Fig. 3.—Appliance remade for the beginning of distal movement on the right side.
Fig. 4.—Showing space gained on right side by mass distal movement.

Treatment.—The plan of treatment was to move both upper posterior segments distally to make room for the locked-out canines. This was accomplished, one side at a time, with Sved's distal-movement appliance[2] (Fig. 2). This assemblage calls for mass anchorage from the cuspid to the second molar on the side opposite to the one being moved distally. In this case the left cuspid being only partially erupted, the left central and lateral were banded as well as the right first premolar and first molar. All these teeth were tied together with rigid 0.040 inch wire soldered to the bands. The only movable part of the appliance is attached to the left first premolar and molar and through a sliding tube activated by "0" elastics the entire segment moves distally against the resistance of the remaining teeth in the arch. The intramaxillary distal force on the left side is augmented by an intermaxillary elastic attached to the buccal aspect of the first premolar band. Fig. 2 shows the appliance in place

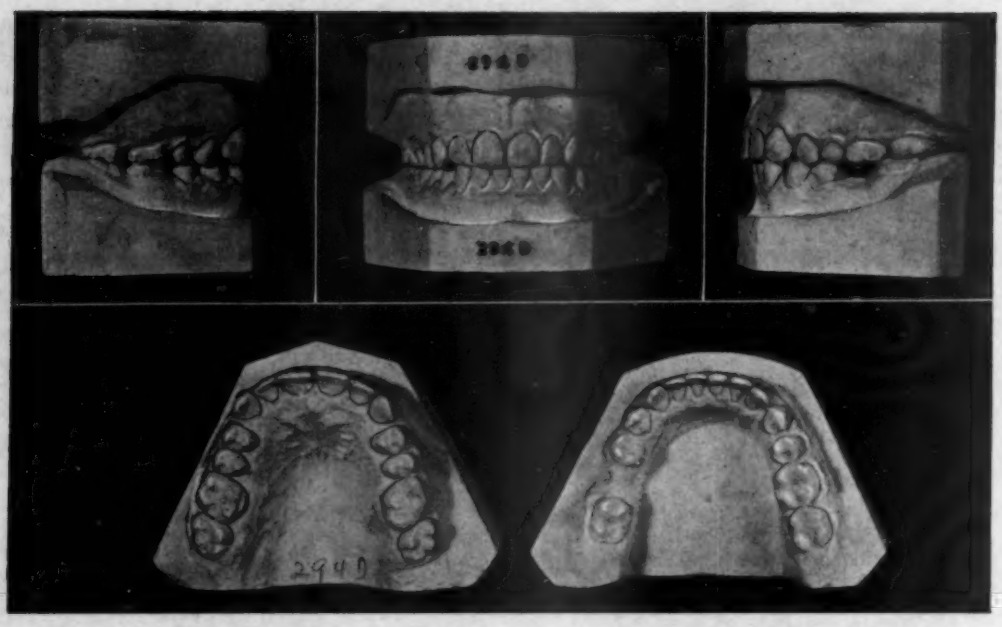

Fig. 5.—Same case as Fig. 1 at the conclusion of two years of treatment.

Fig. 6.—Profile views before and after treatment.

Fig. 7.—Intraoral views before and after treatment.

after the necessary distal movement had been accomplished on the left side. In the lower arch a plain heavy labial wire (0.040 inch) was used, with a vertical tube on the left second molar to permit rotation and uprighting; auxiliary springs were used to move the left premolars mesially. Fig. 3 shows the same upper appliance in place at the beginning of distal movement on the right side. Note that the sliding bar and the intramaxillary hooks have been transferred to the right side. Also note the double palatal bar for extra anchorage. Fig. 4 shows the space gained for the right canine by mass distal movement on that side. Note that in spite of the precautions taken, the anterior teeth were flared labially; also note that some of the space previously gained for the left cuspid has been lost.

When both upper posterior segments had been moved distally, bands with modified edgewise brackets (Sved[3]) were placed on all teeth. By means of light steel round arch wires (0.014 to 0.020 inch), the upper anterior teeth were depressed and the canines brought to place; the lower posterior teeth were elevated by means of vertical bends[4] in the arch wire; a coil spring was used to open the space for the missing lower first molar. Class II intermaxillary elastics were used on the left side to swing the jaw to the right and thus correct the anterior line of symmetry. Fig. 5 shows the relationship of the arches and teeth at the conclusion of treatment (total time two years). A Hawley retainer with an incline plane was used in the upper jaw. In the lower jaw a similar retainer was used, to which a solid piece of acrylic was added to keep the first molar space open and prevent extrusion of the opposing molar. Fig. 6 shows the profile photographs before and after treatment. Fig. 7 shows the intraoral views before and after treatment.

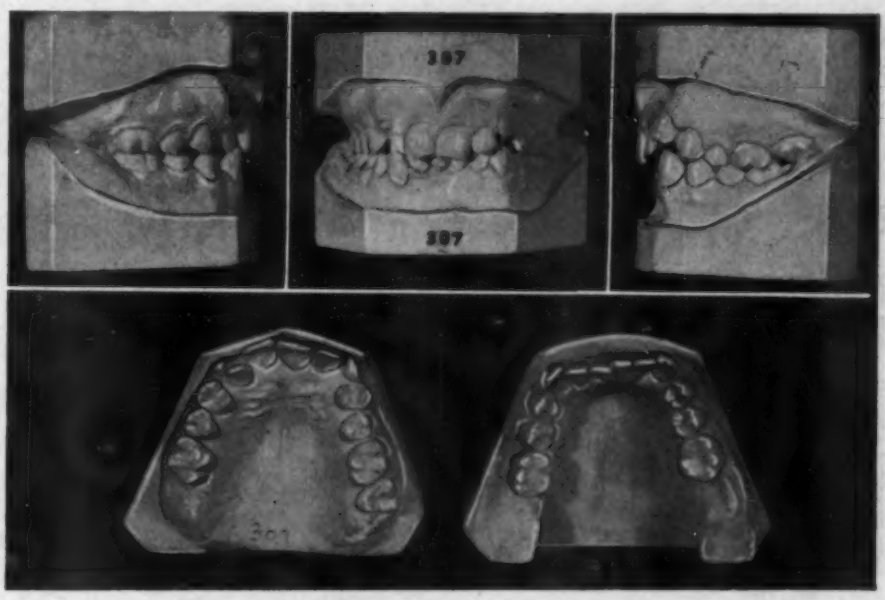

Fig. 8.—Casts before treatment; note bilateral maxillary and mandibular forward drift of the posterior teeth.

Fig. 9. Fig. 10. Fig. 11.

Fig. 9.—Distal-movement appliance in place at the beginning of mass distal movement.
Fig. 10.—Appliance in place after distal movement has been accomplished on right side.
Fig. 11.—Appliance remade to move left posterior teeth distally.

Fig. 12.—Same case as Fig. 8 after eighteen months of treatment and one year of retention.

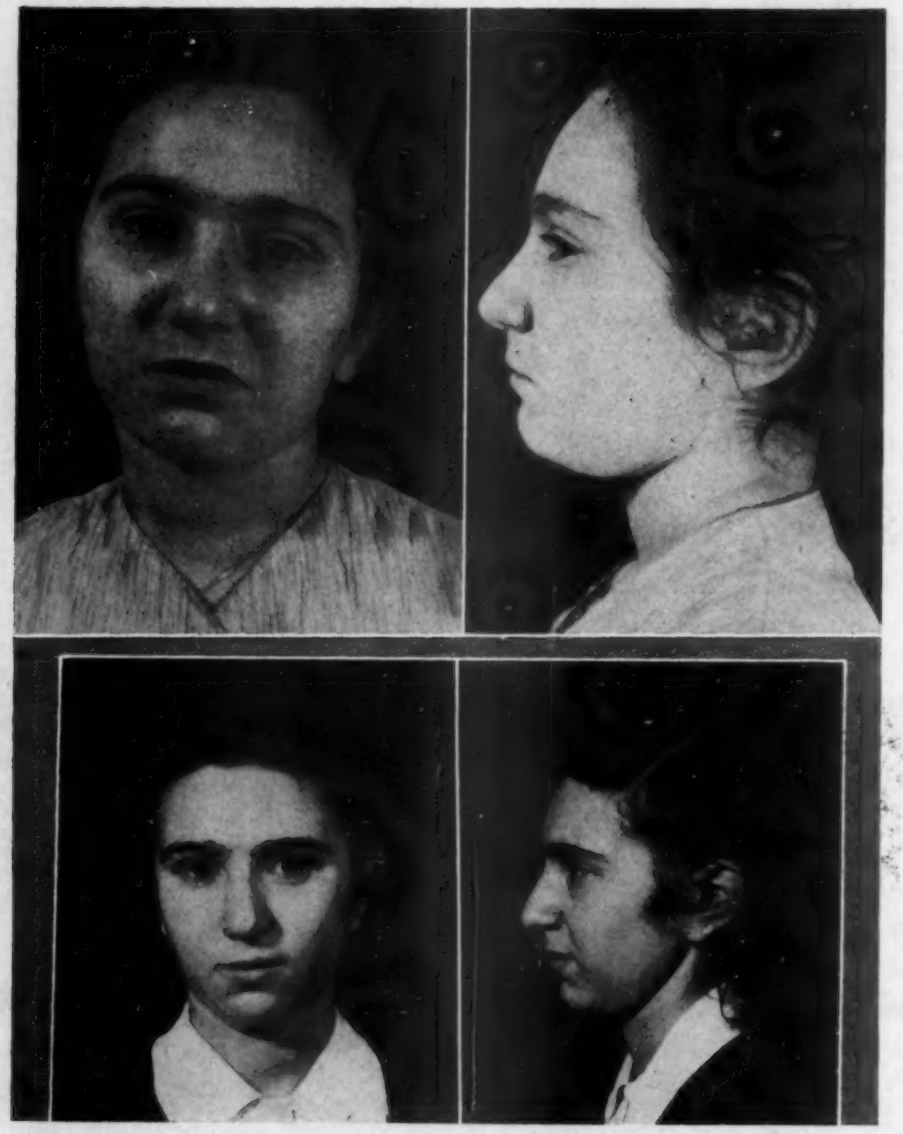

Fig. 13.—Front and profile photographs before and after treatment.

CASE 2.—The patient, a girl aged 11 years, was a normal-birth baby with the customary childhood diseases. She gave a history of a thyroid deficiency for which she received treatment.

An examination of the casts, Fig. 8, reveals a bimaxillary forward drift of the posterior teeth, causing the canines to be locked out. The right lateral is in lingual version with a resulting shift of the anterior teeth to the right. The lower arch is crowded, the canines occupying a position mesial to normal. The lower posterior teeth on both sides have drifted mesially. There is a deficiency in the vertical height of the lower posterior teeth which contributes to the excessive overbite in the incisor region.

Treatment.—A distal-movement appliance, as previously described, was constructed for the upper arch to drive the right posterior teeth distally, Fig. 9. Note that here, too, the central and lateral were banded instead of the canine, which was only partially erupted. Fig. 10 shows the appliance in place after the necessary distal movement had been accomplished on the right side. Fig. 11 shows the appliance remade to move the left posterior teeth distally. A plain heavy labial wire (0.040 inch) was used in the lower arch to provide auxiliary anchorage for intermaxillary elastics while the upper teeth were being moved distally.

Fig. 14.—Intraoral views before and after treatment.

When the necessary distal movement had been accomplished, all teeth were banded with modified edgewise brackets. By means of light steel round arch wires laced into the brackets, the right lateral was moved into its correct labial position, the upper anterior teeth were depressed, and the canines brought into position. The lower posterior teeth were elevated by means of right-angle vertical bends. The attempt to move the lower posterior teeth distally produced a slight flare in the anterior region. Fig. 12 shows the casts after eighteen months of treatment and one year of retention with a Hawley retainer in the upper jaw and a soldered lingual wire in the lower jaw. Fig. 13 shows the photographs before and after treatment. Fig. 14 presents the intraoral views before and after treatment.

CONCLUSION

A study of these two cases reveals the importance of anchorage in attempting mass distal movements in the upper arch. Even with the effective technique just described there is some disturbance in the anterior segment of the upper arch. Anchorage is doubly important in the lower jaw because the tendency for Class II elastics is to move everything forward in the mandibular denture, producing an unstable end result. In the first case described, the mandibular incisors were favorably placed on basal bone to begin with. With reasonable care these teeth were maintained in their original upright position. In the second case, however, the mandibular posterior teeth had drifted forward just like their maxillary antagonists and the use of Class II elastics helped slightly to aggravate the condition in the mandibular teeth. According to Tweed, the incisors in Case 2 would most likely be considered in a slight protrusive position (off basal bone). This suggests the advisability of using a banded appliance in the lower jaw instead of a plain labial wire at the be-

ginning of mass distal movement in the maxillary denture. This would undoubtedly provide greater stability and resistance to displacement of the teeth in the mandibular denture. It also suggests the advisability, in the second type of case, of using Class III elastics on a headgear at night to prevent the mandibular teeth from being displaced forward.

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A STUDY OF ORTHODONTIC ANCHORAGE POSSIBILITIES IN BASAL BONE*

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PURPOSE

THE problem of anchorage has been one of the most difficult in the field of orthodontics. In the past, teeth have been used as a means of obtaining anchorage for the movement of other teeth and for the correcting of deformity in the facial bones. It has been found, however, that the teeth selected for the anchorage often move simultaneously with those in which movement is desired and that little or no effect can be produced on the basal bone because of the instability of teeth when used for the purpose of anchorage. Since teeth have been found to lack sufficient stability to produce certain changes desired in the dentures and basal bone, some other source of resistance has become desirable. Therefore, it was thought that if anchorage could be gained from a point within the basal bone, stability would be greatly increased. It was the purpose of this investigation, therefore, to test a method of basal bone anchorage.

DISCUSSION

Throughout the history of orthodontics there have been repeated efforts to improve the method of resisting the forces applied through the mechanisms used to bring about tooth movement. In the text of Angle[1] we find the following well-worded statements: "According to the well-known law of physics, action and reaction are equal and opposite, hence it must follow that the resistance of anchorage must be greater than that offered by the tooth to be moved, otherwise there will be displacement of the anchorage and failure in the movement of the teeth to the extent, or, possibly, in the direction desired. The sources

*Thesis submitted in partial fulfillment of the requirements of the University of Iowa for the degree of Master of Science.

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at our disposal for securing anchorage or resistance are, first, the teeth themselves, and second, sources external to the teeth. . . ."

In the usual orthodontic appliance one tooth is pitted against another tooth, or one or more teeth are pitted against two or more teeth which, by reason of their position, size, number, or number of roots, offer the resistance necessary to bring about the movement of the weaker members of the group. Since Stuteville[2] has shown that a force of as little as 5 grams will cause tooth movement, and Schwartz[3] has shown that from 20 to 26 grams of force is the optimum amount to be used in the movement of teeth, then it is logical that any intermaxillary or intramaxillary anchorage, using teeth, is reciprocal. Brodie, Bercea, Gromme, and Neff[4] support the above with this statement: "First of all it should be recognized that there is no such thing as true anchorage available within the mouth. We have at our command only different degrees of resistance. These differences are determined mainly by (1) the form and area of the root surfaces and (2) the nature of the surrounding bone."

Sved[5] states that the forward tendency of human teeth is a natural characteristic. Atkinson[6] says, "In the human jaw the tendency of the teeth is to drift forward." Tweed,[7] in discussing his treatment of Class II, Angle places so much importance on the avoidance of forward movement of lower teeth, while attempting to move upper teeth back that he practices a very elaborate mechanical system of "anchorage preparation" in the lower arch.

Margolis[8] finds, from a cephalometric analysis, that the best orthodontic results in white children are those in which the mandibular incisors are vertical and form a right angle with the mandibular plane. A follower of that theory would agree that some means of anchorage is needed to prevent the forward movement of lower teeth, especially tipping of the anteriors which occurs in so many cases during treatment.

One of us,[9] in a recent publication, has shown by a series of cephalometric roentgenograms that a deformity, as in Class II, does not necessarily follow a set pattern, that the teeth may be forward or back from their proper position on the bony base and that many times there is actually a distal locking of the mandible itself. Also, since there is ample possibility of loss of anchorage, there is, therefore, a need for some means of transferring anchorage and stimulation to the basal bone rather than merely to teeth. In the publication just mentioned[9] it is stated: "Perhaps too long we have attempted to stimulate basal bone growth through the media of the teeth but obtained, for the most part, only alveolar bone change. . . . At present, if it is possible to change basal bone, it is accomplished through stimulation derived by the application of force to the teeth. In the future, when present methods fail, stimulation may be attempted by direct application of force to the basal bone."

Therefore, the factors which provoked the work described in this report were twofold: first, to find a means of anchorage other than teeth; second, to transfer stimulation to basal bone for the motivation of mandibular growth. Occipital anchorage is one answer to this first factor. It has been observed that while occipital anchorage may be effective, it depends entirely upon the cooperation of the patient for its success. Then, too, it seems to cause more distress in children of a nervous temperament and, when used with a chin strap in Class III, Angle, it interferes with breathing when the child has a cold or hay fever in certain seasons. Also, because of its unsightly appearance and inconvenience, it can be utilized mostly at night only. Both of these dis-

advantages could be eliminated if bone anchorage within the mandible were possible.

In the *Manual of Fractures,* by Shaar and Kreuz,[10] some of the history of metal appliances in bone surgery is given. We find that Clayton Parkhill inserted screws from cortex to cortex in bone surgery in 1897, Codivilla used pins in leg-lengthening operations in 1904, and Stader introduced his splint in December, 1941, after which it was used in 157 orthopedic cases by Shaar and Kreuz prior to their publication of 1943. Considerable importance seems to be placed on the necessity of keeping the tissue dry around the pin. Pin seepage is spoken of in nearly all publications on the subject of external skeletal fixation and there is some controversy as to whether this seepage is always infectious or whether it may in certain cases be free from infection.

The thought then occurred that if some means of pin or screw attachment might be made to the ramus of the mandible, intraorally, as a means of elastic attachment, it could be used not only in moving teeth but in exerting a pull on the mandible in cases of distal positioning of that member. The pins of the Stader splint were applied through the skin aseptically, and the point of insertion kept dry and free from infection from outside. Any screw or pin in the mouth to be used as an orthodontic attachment would have to project through the mucosa and would form a communication for the oral fluids from the mouth to the bone itself. The only hope for success then would be in some natural immunity of the oral tissues, not possessed by most other body tissues. It is reasonable to believe that this immunity might exist in some degree. One has but to reflect on the condition which exists at the site of the average dental extraction: bone exposed, saliva in the wound carrying with it millions of microorganisms of various types and virulence, food and debris collecting there later, and possibly trauma to the bone at the time of extraction. Transfer this same condition to the tibia and an amputation or worse would probably result.

Bernier and Canby[11] speak of the immunity of the oral tissues when they say, "It appears that in minor surgical operations within the oral cavity, whether or not they involve the implantation of vitallium, there is considerably lessened possibility of secondary inflammatory reaction. This, of course, is borne out in the daily practice of the average dental surgeon."

In the early oral surgery by Brophy,[12] some of it before the turn of the century, silver wires were passed through the maxilla from side to side for closure of cleft palate. These wires were passed in pairs through lead plates in the mucobuccal fold on each side of the face and the ends twisted to hold the bony members toward the midline for the fusion of flaps. This was a type of basal bone anchorage in which the metal appliance communicated from bone to oral cavity. Little mention is made of infection except to give local treatment to be used in the event that infection occurred.

Venable and Stuck[13] are only two of many workers who advocate the use of vitallium where implantation of a metal is needed. Their report contains the following statements: ". . . hundreds of operations have been performed by many surgeons in which vitallium appliances have been used. After six years' experience in hundreds of cases, it is now well established that vitallium is the most inert alloy currently used in surgery. As this record has become known, vitallium appliances of diverse types have been designed by surgeons in other fields than orthopedic surgery. It is this development which we wish to report to demonstrate the protean utility of this alloy and its complete

tolerance to the various fluids and secretions of the body because of its chemical and electrolytic inertness.

In the application of vitallium to the bones of the jaws, mandible and maxilla, Bernier and Canby[11] have implanted screws of this metal in the mandibles and one maxilla of monkeys. Some were placed extraorally, projecting through the skin, and some were placed intraorally in the alveoli of the canines. The screws remained in place except when forcibly removed by the animal. They were left in place three months, after which microscopic examinations were made of the screw sites. These authors said that vitallium was extremely well tolerated by the tissues but the incidence of secondary infection could not be discounted. These screws, however, became covered with a membrane when placed intraorally and therefore could not be used as a means of orthodontic anchorage. Nevertheless this statement by Bernier and Canby[11] was of interest: "When it [vitallium] is inserted intraorally this possibility [of infection] is considerably lessened. . . . It appears that vitallium alloy remains essentially inert when in contact with the body tissue. This has been adequately explained on the basis of the total absence of any electrolytic force."

Therefore, since the literature points to a need for basal bone anchorage and since there is evidence that the tissues of the mouth may be more tolerant of foreign objects than other body tissues, it was decided to conduct an experiment on six dogs and attempt to gain a point of anchorage in the ramus of the mandible by means of a vitallium screw hook placed in the bone.

Fig. 1.—The Coe-Loid impressions were poured in artificial stone with Snow-White art portions and articulated for study of the occlusion and for design of appliance.

EXPERIMENTAL PROCEDURE

Six dogs, mongrels selected from the stock of the University of Iowa Medical Laboratories, were used in the animal experimentation which was done in connection with this study. The animals varied in weight from 22½ to 29 pounds and were fed on a diet of Purina Dog Chow. No operating was done until the animals had been on this diet for fourteen days. All operations were done under general anesthetic: nembutal, 15 per cent, in a solution of ethyl alcohol, administered intravenously in the hind leg of the dog. Complete relaxation was obtained immediately and lasted for at least three hours.

Each dog in turn was anesthetized and impressions were taken in Coe-Loid, using trays constructed especially for the dog dentition. Casts were poured in stone and the appliances were constructed upon these casts (Fig. 1). The appliance in each case was placed during the second anesthetization as were the screw hook and elastic band for traction.

The problem in this study was to test some means of basal bone anchorage. It was desired to attach an appliance to the upper canine because of its anatomy and ease of banding. The logical place to attach to the basal bone was in the ramus of the mandible. The only point which seemed practical to be used as a site for screw insertion was immediately distal to the last mandibular molar. Unfortunately, even this point in the dog skull is closely crowded behind the tuberosity of the maxilla when the teeth are closed and especially so in the living dog with the soft tissue on the bony framework. Note, too, that a straight line from that point of insertion to the upper canine of the same side would pass across the biting surface of the upper and lower second molars and lingually to the first molars and third premolars (Fig. 2). This made it necessary to pass the line of force outward around the great curve of the line of teeth.

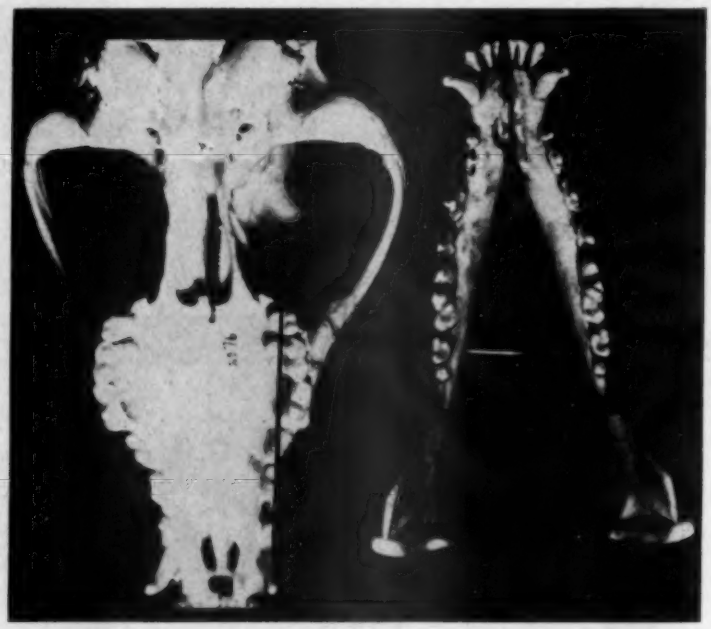

Fig. 2.—Occlusal view of a disarticulated Collie skull. Black line shows the straight line of force from the point of screw insertion in the mandible to the canine. Note that this line would pass through the molar biting surfaces. For this reason a cast overlay was used on the first maxillary molar in the appliance designed.

For Dogs 1, 2, 3, 4, and 5, each appliance was constructed as follows: (Example, Fig. 3) A silver overlay, the thickness of two layers of 30 gauge wax, was cast to fit the upper first molar. This overlay was constructed with a buccal flange in line with the axis of the tooth. This flange was perforated, after casting, to form a hole approximately 0.050 inch in diameter, and to act as a buccal guide for an arch wire. A pinch band was constructed of 0.003 inch stainless steel to fit the canine tooth, and a stainless steel wire 0.040 inch in diameter was spot-welded to the outer surface of this band. The 0.040 inch wire was bent gingivally and made to follow at the level of the gum line to the first molar, then occlusally and back through the perforation in the buccal flange on the molar overlay (Fig. 3).

A vitallium screw of the type used in the Berry jaw-fracture appliance[14] was cut down to an over-all length of about 13 mm. The head of the Berry screw contains a transverse perforation through which a piece of 0.040 inch stainless steel wire can be passed. This was done, and the wire was bent to

form a hook to project from the soft tissue when placed in the mandible of the dog and to receive one end of the elastic to be used in supplying the traction, the other end of the elastic to be attached to the hook at the distal end of the upper arch wire.

Fig. 3.—Skull of Dog 3 with appliance constructed as used on opposite side in life. Force is applied through the traction of the XX elastic which connects the two hooks. The arch wire is welded to the canine band and slides freely in the perforated buccal flange of the molar overlay.

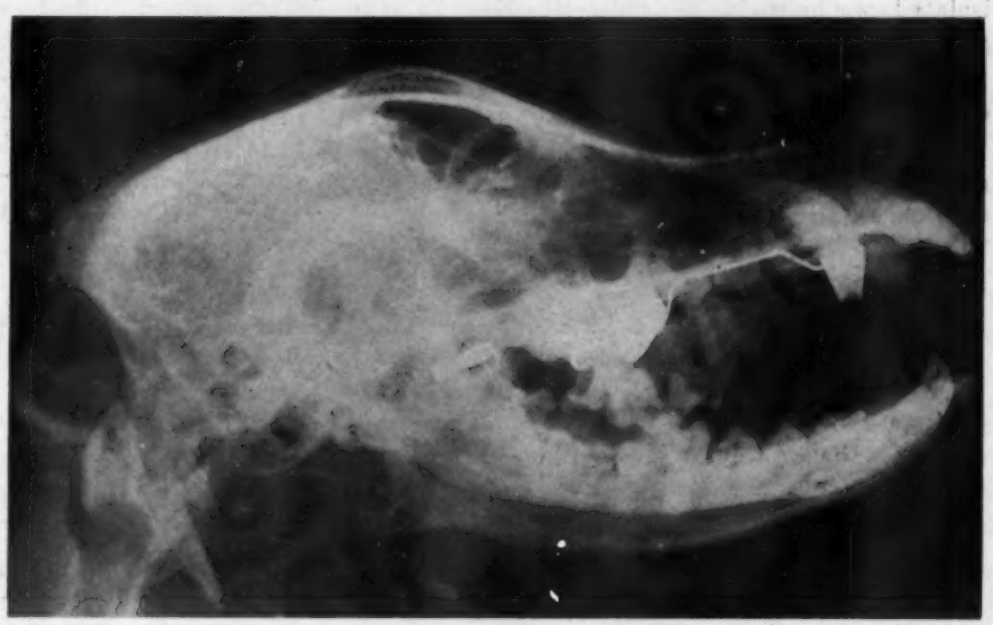

Fig. 4.—Dog 3 with appliance placed on left side (in life). The screw was inserted through two cortices of bone, from the anterior border of the ramus to the masseteric fossa.

Vitallium was chosen as the metal to be used for the screws to be placed in the mandibles because of the wide use and acceptance of this metal in all types of bone surgery as already stated. It was theorized that the use of an elastic to supply the force or traction would eliminate any electrolytic action which might occur if the appliance on the teeth were of a different potential from that of the screw.

Dog 6 and Dog 1 (second test) were used to test the reaction to screws placed in the mouth with no traction applied.

Dog 5 (second test) and Dog 2 (second test) were used to test the reaction to a stainless steel ring placed in the mandibular bone with traction applied. These additions to the appliance design of the first five tests will be explained under the report of results.

The Operation.—The operation on each dog was done under a general anesthetic after the appliance was completed and ready to be placed. A surgically clean procedure was used with sterile instruments and an isolated field of operation, but no antiseptics or solutions were used in the wound. The animal in each case was placed on the operating table with the head-holder in place, and an incision was made in the tissue covering the anterior border of the ramus just distal to the last mandibular molar. The bone at this point in the dog has a slight groove on the anterior surface and this was used as a starting point for the placing of the screw. A pioneer hole was drilled in the bone with a bit 2.4 mm. in diameter, just large enough to allow the screw to be started, or about the diameter of the screw minus the threads. A hand drill was used in every case in order that there would be no heat developed in the drilling process to cause injury to the surrounding bone.

A vitallium screw of the Berry type, as previously described, was placed in the ramus, following the pioneer hole, using a pair of parallel jawed pliers with a great deal of force, giving complete rigidity of the attachment. Following this, the upper canine and the upper first molar of the same side were isolated, washed with alcohol, and dried. The silver overlay and pinch-band appliance were placed with a mixture of oxyphosphate of zinc cement and held in place until set. An orthodontic elastic was then placed from the hook of the arch wire to the hook at the end of the screw to supply the traction force (Fig. 3). It was attempted to choose an elastic in each case which would give, as nearly as possible, the amount of force in the usual intermaxillary appliance used on human patients. The forces ranged from 140 grams to 200 grams in the closed relationship of the jaws. Roentgenograms were taken to show appliance design and tissues involved (Fig. 4).

Tests were made, using two dogs with screws placed as described but without traction applied. Two more tests were made using a stainless steel ring which passed around a portion of the bone of the ramus and ended in a hook to which traction was applied. Further details are given in the report of results that follows.

RESULTS

Screw With Traction.—Dog 1 showed no visible ill effects following the placement of the screw and appliance until the third to seventh days when there was some soreness about the screw. There was very little redness of tissue, but after the eleventh day following the operation there was some loosening of the screw, and it came out in sixteen days, and the wound healed. Approximately 200 grams of traction were applied to the screw in this test.

Dog 2 continued to eat well after the appliance was placed. Some soreness developed in the region of the screw from the second to the ninth day, after which it greatly decreased. In seventeen days the elastic was lost and the dog was given an administration of ether for the placement of a new one. After the eighteenth day there was some loosening of the screw. It was lost in twenty-one days, and the wound healed. The traction over a period of

twenty-one days resulted in a tooth movement of 1 mm. A force of 140 grams was used.

On Dog 3 an elastic was used which exerted 160 grams of traction on the screw when the jaw was closed (Fig. 4). The animal ate well and allowed examination of the appliance without anesthesia. In thirty days there was some inflammation, but the appliance was still active. In thirty-five days the screw was out and the wound healing. The dog was sacrificed on the fifty-third day and the skull was cleaned and bleached for study. An examination of the bony material thus obtained (Figs. 5 and 6) showed the following:

The site at which the screw was placed in the left ramus remained as a hole 5 mm. in diameter (Fig. 5), though the screw had been only 3.4 mm. in diameter outside the threads. A perforation is seen in Fig. 6 extending through the ramus at the point formerly occupied by the apex of the screw, opening into the masseteric fossa. There were tiny perforations resulting from an increase in vascularity over an area around the screw site, 15 mm. in diameter. The unoperated ramus on the right side showed no such evidence of vascularity; therefore, it was concluded that this was a reaction to the placement of the screw. As a result of the orthodontic force there was a movement of the upper left first molar 1.5 mm. toward the midline. The canine, being a deep-seated tooth in the dog, offered sufficient resistance to prevent more than 0.2 mm. of distal movement, but the resultant lingual force of the elastic

Fig. 5.

Fig. 6.

Fig. 5.—Left mandible of Dog 3 after the screw had been in place for thirty-one days.

Fig. 6.—Lateral view of left mandible of Dog 3, from the buccal. Perforation occurred at the end of the screw, which was inserted through the bone from the anterior. A slight amount of bone repair has taken place.

caused the lingual movement of the first molar as given. Thus tooth movement was obtained by anchorage to the basal bone.

Dog 4 was of the Spitz type, weight 20 pounds, and the bone structure was lighter than is desirable for easy operation. However, the screw was placed and a traction of 160 grams applied to it by means of an elastic, size XX, stretched 20 mm. at rest. The dog showed no signs of discomfort while wearing the appliance, ate well, and was very active at all times. The elastic was lost in nineteen days, and the screw came out in twenty-six days. After forty days from placement of the screw, the dog was again anesthetized and an incision made to examine the bone at the point where the screw had been placed. The bone showed an indentation at the screw site with a tough cartilaginous tissue where the screw had come out. There seemed to be no necrotic tissue present, but the last mandibular molar was quite loose and was easily flipped out of the arch with a periosteotome. This was concluded to be evidence of rarefaction of the bone in that area, especially after the postmortem bone picture of Dog 3 (Fig. 5). Measurement showed a 1 mm. decrease in the cuspid to first molar distance.

Dog 5 was a 34-pound animal with a well-developed bone structure. A screw and appliance were placed with 160 grams of traction. Only a limited degree of soreness developed, and the animal would allow examination of the mouth at any time. In twenty-nine days the screw came out, and the wound healed. Thirty-six days after the operation the dog was again anesthetized, and an incision was made to examine the old screw site. The indentation remained, the hole was filled with a fibrous material, and there was apparently no necrotic tissue present. There was a small amount of scar tissue in the mucosa, probably from the original incision.

Screw Without Traction.—Dog 6 was anesthetized and a vitallium screw was placed in the left ramus as on Dogs 1, 2, 3, 4, and 5. In this case, however, there was no appliance on the teeth and no traction was applied to the screw. The head of the screw projected through the tissue about 3 mm. but did not interfere with the closure of the jaw in any way. There was very little soreness apparent in the mouth of this dog, and the screw came out and was lost in twenty-one days. The wound healed readily and there was no apparent sloughing or drainage.

Dog 1, having lost a screw from the left mandible, was used again two weeks after that loss for the test of reaction to a screw without traction. This is referred to as Dog 1 (second test). This time the right mandible was used and the screw placed as in Dog 6 with no traction applied. The screw was lost in twenty-one days.

In these last two tests there was apparently less soreness about the screws than in those animals where traction was applied. This may have been due to the absence of traction. However, the short time the screws were retained would suggest that the loss of all of the screws may have been due to a cellular reaction and that the traction used in the first five of the series may have had very little effect on the time required for loss of the screws.

Ring With Traction.—Dog 5 (second test) was anesthetized and a hole was drilled from the anterior border of the ramus straight back into the masseteric fossa. An annealed 0.040 inch stainless steel wire was passed through the hole, forward around the buccal ridge of bone, and twisted upon itself at the anterior border. The free end was bent into a hook for the application of trac-

tion by an elastic. Here a traction of 200 grams was applied and allowed to act for twenty-four days, at which time the animal was sacrificed and a microscopic section was made at the site of bone resorption. The steel ring had been carried about halfway through the original bone structure which it encircled. Since the microscopic findings are being more fully studied in work now in progress, they will not be discussed here.

Dog 2 was reused (second test) to study the reaction to a steel ring in the ramus of the mandible as in Dog 5 (second test). The ring developed some looseness and caused more soreness than when a screw was used. It came out and was lost in fourteen days. Eighteen days after the ring came out, the animal was sacrificed and the bone prepared for study. Fig. 7 shows the ramus of this dog after the bone was cleaned and bleached. The destruction of the bony ridge may be seen by a comparison with a normal ramus (Fig. 3). The area may be seen in which new bone has been laid down, and there is a general smoothing of the surfaces of the injured area.

Fig. 7.—Bone destruction on mandible of Dog 2, eighteen days after the ring had come out. Compare with normal jaw (Fig. 3).

TABLE I. CONDENSED OUTLINE OF ANIMAL EXPERIMENTATION

DOG USED	WEIGHT (LB.)	SIDE	SCREW PLACED	AMOUNT OF TRACTION (GM.)	SCREW OUT	DAYS IN PLACE	REMARKS
Vitallium Screw in Bone With Traction							
1	22½	L	11/21/44	200	12/ 7/44	16	Reused; movement 1 mm.
2	27	R	11/28/44	140	1/ 6/45	21	Reused; movement 1 mm.
3	37	L	12/ 7/44	160	1/12/45	31	Sacrificed 1/29/45, movement 1.5 mm.
4	25	L	12/12/44	160	1/13/45	25	Movement 1 mm. Small mandible
5	34	L	12/15/44	160	1/13/45	29	Reused for ring test
Vitallium Screw in Bone Without Traction							
6	39	L	12/16/44	None	1/ 6/45	21	Sacrificed 3/20/45
1	22½	R	12/16/44	None	1/ 6/45	21	Sacrificed 3/8/45
Stainless Steel Ring in Bone With Traction							
5	34	L	1/20/45	200	Killed	24	Pathologic section being made
2	27	R	1/27/45	200	2/10/45	14	Sacrificed 3/1/45; 1 mm. movement

SUMMARY

In each of five dogs a screw of vitallium was placed in the anterior border of the ramus of the mandible, one side on each dog. Traction was applied to the screw by means of an orthodontic elastic connected to a maxillary appliance. All of the screws came out in from sixteen to thirty-one days.

In two dogs vitallium screws were placed in the rami, one side only, and no traction applied. Each screw came out on the twenty-first day.

In two dogs stainless steel annealed wire rings were placed about the anterior portion of the ramus on one side of each dog. Traction was applied to these rings by means of elastics connected to maxillary appliances. One ring came out in fourteen days. The other was loose when the animal was sacrificed after twenty-four days. The tissue was taken for microscopic study.

Examination of the bones from sacrificed animals showed a wide destructive process after implantation of either the screws or rings in the rami.

Tooth movement was accomplished using basal bone anchorage, but an effective force could not be maintained for more than thirty-one days in any case.

CONCLUSIONS

While it is hoped that some means of basal bone anchorage may be obtained for orthodontic movement in the future, the results as given in this report do not warrant its use in the manner shown here. While the tissues of the mouth show more immunity to infection than most body tissues, its importance cannot be ignored.

It is objectionable to enter the tissues surgically in the manner described in this report as part of an orthodontic treatment. In addition to the danger from infection, the screws or rings do not remain stable over a period of time which would be necessary for most orthodontic correction.

It is believed that the prompt loosening of all screws and rings placed in the mandibles in this experiment was largely due to the communication with the oral cavity and the resultant contact with the fluids and microorganisms of that region.

The loosening of the third mandibular molar, and the perforations seen in the bones examined, indicated an effort for the bone to repair itself. Todd[15] has said that "A telltale vascularization indicates a site of rapid growth or adjustment." Therefore, a metal appliance placed in the manner described acts as a foreign body, causing bone changes which would not be compatible with orthodontic treatment. It is intended that further experiments shall be conducted in which a screw of considerably smaller diameter shall be implanted, leaving only an amount projecting past the surface of the bone for later anchorage attachment. The overlying tissue will then be allowed to heal and thus cover the metal screw with scar tissue which is quite resistant to infection. After complete healing, anchorage attachment will be made to the screw through a small puncture instead of an incision. Stimulation of the formation of granulation tissue or scar tissue before insertion of the wire for attachment is made may minimize the passage of infection to the bone.

Work is also being carried on in the department at this time to design a more efficient tissue-borne appliance which will accomplish certain orthodontic movements without direct attachment to the teeth alone.

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Editorial

Journalistic Sabotage

THOSE charged with the responsibility of publishing the proceedings of the American Association of Orthodontists have grown weary of the continued misrepresentations that have been made over a period of years by the Committee on Journalism of the American College of Dentists.

One of the Associate Editors of this JOURNAL, who has contributed much to both the JOURNAL and to orthodontics, writes a reply to the reprint which was recently sent to the members of the American Dental Association by the American College of Dentists.

Dr. McCoy is a past president of the American Association of Orthodontists and a member of the committee appointed by the Association to arrange for the publications of the proceedings of that organization.

Dr. McCoy's open letter, which was addressed to the secretary of the American College of Dentists, will be of interest to all who have followed this travesty on justice over a period of years. The letter follows.—*Editor.*

June 20, 1945

"When I received the December issue of the Journal of the American College of Dentists and read therein the report of the Committee on Journalism by J. Cannon Black, I immediately realized that insofar as it referred to the American Journal of Orthodontics and Oral Surgery, the report was malicious, inaccurate and untruthful, both from the standpoint *of what it said* as well as *what it left unsaid.* I was not greatly surprised, for in the past this mentally myopic Chairman and a Committee which has supposedly collaborated with him have been sniping at the American Journal of Orthodontics and Oral Surgery, and incidentally, at its sponsors, the American Association of Orthodontists. The latest bit of effrontery came when you or they mailed a copy of the report to every member of the American Dental Association. In view of the nature of the report and its definite misinformation relative to our Journal, this act, in my opinion, *was the most unethical thing which has occurred in the dental profession in the past decade.* It is needless for me to tell you that all fair-minded members of the American Association of Orthodontists and also those members of the American College of Dentists possessed of a sense of fair play will resent both the report and your action.

"One of the things left *unsaid in the report* was that more than five years ago an agreement was drawn up and executed between the C. V. Mosby Company and the American Association of Orthodontists, whereby the professional control of and responsibility for the conduct of the American Journal of Orthodontics and Oral Surgery was placed upon an Editorial Board, the majority of whom shall be elected from the seven sectional societies of the American Association of Orthodontists, one such editor representing each such sectional society. It was further provided that insofar as possible this board shall be made up of past presidents of the American Association of Orthodontists, which situation was in effect at the time the agreement was made. A block subscription basis was established which was very advantageous to our membership, and other conditions were also covered which the Publication Committee of which I was a member at that time felt would take care of future exigencies and provide a basis of fair dealing between all parties concerned. The whole matter was submitted at open meeting to the American Association of Orthodontists, and after an intelligent discussion was approved without a dissenting vote.

"In view of these facts the statement of the Committee on Journalism of the American College of Dentists that 'there seems little justification for such a large specialty group as the Orthodontists to permit a commercial journal, over which they have little if any control,

to publish their proceedings. . .,' staggers the imagination of those who have the ability to think rationally. Another thing *left unsaid* in the report but known to all old members of the American Association of Orthodontists, was that for twenty years *prior to control established by contract* we had *the moral control of our Journal,* for the C. V. Mosby Company granted every wish we expressed and allowed us to fashion the policy of our publication. It is too bad that your committee does not appreciate the significance of *moral controls* for they are really important in many of life's relationships.

"All of these facts must have been known to you and to the Committee on Journalism. It is difficult therefore to reconcile the intolerant or let us say stupid action which is made evident by their report and your contribution to the sabotage of the efforts of the American Association of Orthodontists to give its members a journal of a high order. When we realize that our Journal, working in collaboration with the various orthodontic societies sponsoring it, has produced and accumulated one of the richest scientific literatures in the entire history of the dental profession, one is led to wonder by what yardstick journalism is to be judged. Perhaps the advice given by the Survey Committee of the American Association of Dental Editors published in their 1943 transactions should be followed. I quote a portion of it which states, 'Above all things, let us strive for balance in our deliberations and in our literature. Let us be generous, let us be charitable, let us be consistent, but do not let us pursue the foolish policy of advocating a lot of measures that are wholly impractical just because we have become obsessed with an itch for criticism based on ignorance of the real essence of the situation (the baneful influence on the profession of so-called trade journalism) or the real needs of the profession. . . . The crusade against dental publications termed Proprietory has outlived its usefulness, and for the benefit of dental journalism in general and the broadening of the services of this democratic organization, the words proprietory and non-proprietory should be erased in its Charter and By-Laws.'

"Another thing which was *not recorded* in the report of J. Cannon Black was that the C. V. Mosby Company publishes eight other scientific journals devoted to the various specialties of medicine, working in conjunction with national, official scientific organizations of the various specialties. They have informed me that in no instance has there been an effort at sabotage *save by the Committee on Journalism of the American College of Dentists.* It might also be worth recalling that this Company publishes a large number of standard medical and dental textbooks which even the most bigoted will admit constitute the lifeblood of any profession.

"It is worth recalling that another corporation, The Year Book Publishers of Chicago, print and sell *an annual* called *The Year Book of Dentistry,* as well as other highly useful *annuals* devoted to special fields of medicine. Your Committee approves these *annuals* published by a *medical publishing corporation* and yet voice their disapproval of a *monthly* publication, The American Journal of Orthodontics and Oral Surgery, published by a *similar corporation.* One is prone to agree at this point with the Bard of Avon, when he said, 'None are so blind as those who will not to see.'

"Another thing which that matchless logician (?) J. Cannon Black stated in his report was that, 'Since the creation of the Journal of Oral Surgery under the sponsorship of The American Dental Association, there is a noticeable change in the number of literary contributions published in the orthodontic section of the American Journal of Orthodontics and Oral Surgery.' What he neglected to say had he wished to be fair was that since the period of the war our orthodontic societies have been collaborating with the national government in the war effort and have kept their meetings purely local in nature and have cancelled their scheduled conventions. Naturally, this has cut down upon the production of papers and essays but in spite of this fact *our Journal has maintained its normal size and standard of usefulness.* A comfortable backlog in both orthodontics and oral surgery is available. In the latter instance all space has been allotted previous to 1946. This valiant crusader for truth (?) also made a slight error when he stated that the American Association of Orthodontists was paying The C. V. Mosby Company $6,078.00 per year, while by check with the auditor we find the amount to be $3,515.00. This slight error, of course, only amounted to $2,563.00. Adolph Hitler's pot-bellied Goebbels appears to be developing a rival.

"Considering the report as a whole and especially that part of it relating to the American Journal of Orthodontics and Oral Surgery, one is reminded forcibly of a building with ample heating facilities but without any means of ventilation. It is unfortunate that a few mental windows cannot be opened among the group so that befogged and stupified mentalities can have a chance at rejuvenation and clarification. If the report was made sincerely then its content can only be judged as being colossally stupid. If this is not the answer,

then it can only be judged so malicious and unjust that it belongs in the same category with those who burned old women as witches in ancient New England.

"The bracketed foreword appearing at the top of the reprint you sent out to all members of the American Dental Association contains this closing sentence, 'Read it carefully and then write us your comments; we will be glad to receive them.' Had you been imbued with the real spirit of good sportsmanship, you would have added *such comments will be given the same wide circulation* as the 'Report of the Committee on Journalism of the American College of Dentists.' Perhaps you intended to say that. Trusting you will feel that I have complied with your request, I am

"Very truly yours,
(Signed) JAMES D. MCCOY, D.D.S., F.A.C.D.

"P.S. Since this may be considered an open letter, I will send you mimeographed copies for the members of the Committee on Journalism."

AN OPEN LETTER

TO THE BOARD OF DIRECTORS OF THE AMERICAN ASSOCIATION OF ORTHODONTISTS AND TO THE OFFICERS OF ITS COMPONENT SOCIETIES

Dear Doctor:

It has been said that in this country you can print most anything within the limits of libel, treason and decency without repercussion.

There is one thing however that propaganda blocs cannot do within the law, and that is to broadcast false and libelous propaganda through the mails. It is presumed that you received a reprint of the report of the propaganda Committee on Journalism of the American College of Dentists that was recently mailed in display envelopes to the membership of the American Dental Association, at A. C. D. expense.

In reading this reprint it was noted that every statement made in reference to the relations of the American Journal of Orthodontics and Oral Surgery and the American Association of Orthodontists was either false or studied propaganda plainly designed to create a false impression in the mind of the reader.

It is well known, by the members, that the relations of the American Association of Orthodontists and the American Journal of Orthodontics are established by contract and that this contract was approved by the Board of Directors of the American Association of Orthodontists after a special appointed committee had given the plan much thought and study.

The constant and studied "needling" of the relations between the journal and society by this group (if we may judge by the letters that come in here) has passed the stage of appeasement. Inasmuch as the efforts of the various orthodontic societies in conjunction with the journal has brought about the publication of the richest scientific literature in the history of any single department of the dental profession, it is thought by many that this committee report is little short of malicious.

This latest move of this committee smacks of the spreading of false and libelous propaganda through the mails. By way of illustration, the propaganda committee report that was mailed out to the A. D. A. membership states that the American Association of Orthodontists paid the Mosby Company $6,078. What was actually paid to the Mosby Company (by check with the auditor) was $3,515, only the small difference of $2,563—Goebbels did no better than this in his prime.

The Mosby Company publishes eight other scientific journals, devoted to the various specialties of medicine working in conjunction with national, official organizations of the various specialties. They have advised that in no instance are any propaganda agencies at work, save in the American College of Dentists Committee on Journalism.

Inquiry has been made over a period of several years and it has been learned that a great many of the more substantial members of the American College of Dentists look upon the activities of the "witch burning" element in their organization with tongue in cheek and

many believe that the well-known combination of crusader and publicity syndrome is the principal urge behind the entire gesture, past and present.

The above subject has been the inspiration for a great deal of correspondence by the official editorial board of the American Journal of Orthodontics and Oral Surgery and it was thought among the majority that a letter should be sent to the officers, board of directors and sectional officers of the American Association of Orthodontists so that the officials may be informed of the "goings-on" of the propaganda committee above referred to, who have been "needling" your association and journal for a number of years.

Yours very truly,

(Signed) H. C. POLLOCK, Editor

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There may be members in the Service whose names do not appear in the above list. These members should notify the secretary at once so that their names may be included.

Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

Approved Laboratory Technic, Clinical Pathological, Bacteriological, Mycological, Virological, Parasitological, Serological, Biochemical and Histological: By John A. Kolmer, M.S., M.D., Dr.P.H., Sc.D., L.L.D., L.H.D., F.A.C.P., Professor of Medicine in the School of Medicine and the School of Dentistry, Temple University; Director of the Research Institute of Cutaneous Medicine; formerly Professor of Pathology and Bacteriology, Graduate School of Medicine, University of Pennsylvania, and Fred Boerner, V.M.D., Associate Professor of Clinical Bacteriology, Graduate School of Medicine and Assistant Professor of Bacteriology, School of Medicine, University of Pennsylvania, Bacteriologist, Graduate Hospital, Philadelphia. Pp. 1017. New York, D. Appleton-Century Company, Inc., 1945.

This volume deals with laboratory techniques. It does not discuss changes due to disease and their interpretation, which are treated in a separate book by Kolmer on *Clinical Diagnosis by Laboratory Examinations*. Methods of microscopy are discussed and illustrated. The care and selection of animals for diagnostic tests are discussed. Methods are presented for routine blood examination which include counting of the various blood cells, the determination of coagulation time, the calcium time, sedimentation rate, and other tests. Included under the methods for the examination for saliva are methods for collecting saliva, determining specific gravity and reaction. These should be of interest to the dentist. Methods are presented for the collection and handling of the material for bacteriologic examinations and for the preparation of culture media.

The collection of material from the teeth and gingivae includes the bacteriologic examination of extracted teeth, cultures of socket material, and culturing periapical region material through the root canals with the tooth in situ. The principles and method of the bacteriologic examination of the mouth, teeth, and gingivae are given. This book will be found especially useful by those dentists who are interested in making their own laboratory tests in establishing diagnoses and in conducting research experiments.

Impacted Supernumerary Incisors. Treatment of a Complicated Class II, Division 1 Case: By William S. Smith, D.D.S., San Francisco, California, *Angle Orthodontist* **14**: 24-28, January and April, 1944.

The supernumerary teeth in this case were responsible for serious loss of bone tissue surrounding the permanent maxillary incisors. Following the surgical removal of the teeth, the afterpain and soreness were directly responsible for the discontinuing of a thumb-sucking habit of long standing. It was necessary to remove the supernumerary teeth before the maxillary incisors were to be moved distally.

The patient, a girl aged 9 years, had a typical Class II, Division 1 malocclusion with considerable maxillary protrusion and lack of forward growth in the mandible. The lips lacked muscle tone and expression. The bone tissue, as shown by the roentgenograms, was slightly osteoporotic.

The etiological factors were severe thumb-sucking and mouth-breathing. It is possible that the presence of the supernumerary incisors caused a sensation of pressure in the central incisor region, for the patient complained of such a feeling and declared that the thumb-sucking relieved it. On the other hand, this explanation by the patient may have been made to reconcile the thumb-sucking habit. The habit was immediately stopped after the removal of the supernumerary incisors. The most plausible explanation was that, due to aftersoreness and pain, the habit in this case was broken.

The removal of the supernumerary incisors proved to be extremely difficult. The tooth that was the lowest between the central incisors, as shown by the roentgenograms, was easily removed but not so the one that was higher. Further roentgenograms taken after the removal of the lower one, and after an attempt had been made to locate the higher one by the removal of bone tissue of the hard palate, show that the upper tooth had been partially pushed into the nasal passage. The tooth was finally removed through the opening in the palate but not until after a severe hemorrhage of the anterior palatine artery. A secondary hemorrhage followed twenty-four hours later and was quite serious, for most of the bleeding was through the nasal passage. The patient was confined to bed for ten days.

News and Notes

Bronze Star Medal to Dental Officer

Major Fred G. Nasr, D.C., of Omaha, Nebraska, has been awarded the Bronze Star Medal for saving the lives of two Filipino soldiers. According to his citation, Major Nasr, then Captain, "On March 27, 1942, although injured and having one arm in a cast, left his collecting station at Marivelles Air Field, Bataan, Luzon, Philippine Islands, to rescue two Filipino soldiers who had been buried alive in a bomb crater. Braving heavy bombardment and strafing by Japanese aircraft, he remained at his self-appointed task, liberated the two soldiers and then gave them necessary medical attention at his aid station. His heroic conduct and great personal risk saved the lives of the two men." Major Nasr was taken prisoner of war but later liberated and returned to the United States.

Dental Officers Receive Right to Command

On June 30, a law was enacted by Congress which gives Dental Corps officers equal command privileges with other officers of the Medical Department except in the case of hospital commands. Hospital commands are delegated to Medical Corps officers according to Army Regulations.

Heretofore, command privileges of dental officers have been limited by law to within the Dental Corps.

When Dental Corps officers were first commissioned in 1911 they were commissioned only as first lieutenants, while Medical Corps officers held higher ranks. The question of command was therefore not an issue. Now, however, the Dental Corps includes many high-ranking officers. Furthermore, the Medical Department has expanded to include the Sanitary Corps, the Medical Administrative Corps, the Veterinary Corps, and the Pharmacy Corps—none of which came under the obsolete law. The law had to remain in effect, however, until joint action was taken by both houses of Congress and approved by presidential signature.

U. S. Senate Committee on Education and Labor

Senator Claude Pepper and Senator George D. Aiken introduced into the Senate a bill to provide for more adequate dental health programs throughout the Nation.

In introducing the bill, Senators Pepper and Aiken issued the following statement: "Selective Service examination figures have revealed the appalling extent of dental defects among our people. The Army has had to correct dental defects among more than 1,000,000 men before they could be made fit for military service. This has placed a tremendous burden on the Army Dental Corps and has made it necessary for the Army to recruit so many dentists that there are not enough left to take care of the civilian population. Today it is not unusual for a civilian to have to wait months for a dental appointment.

"The solution of the problem lies not only in removing the huge backlog of dental neglect, but in training more dentists and providing them with opportunities for remunerative practice. Even in peacetime we did not have nearly enough dentists to take care of the dental needs of the people.

"Dental disease is the most universal of all human afflictions. Diseased teeth are not only a liability in themselves, but as centers of infection they are responsible for a whole catalog of ailments and disabilities. Yet, outstanding dental authorities tell us that not more than 30 per cent of the people get the routine dental attention they need for good health. As a result we are, in the main, a Nation of dental cripples. Dental neglect is costing us more individually and collectively than proper dental care would cost. The bill which we have introduced would, if passed, go far toward meeting dental needs."

The bill, which Senator Pepper and Senator Aiken said had the support of the organized dental profession, would provide: (1) Financial aid to states and municipalities for prevention, treatment, and control of dental diseases, including dental care for children. (2) Training of personnel for dental health work, and education of the public concerning dental health. (3) Funds to states, municipalities, educational institutions, and other nonprofit agencies for studies and demonstration programs in dental care, administrative practices in dental health, and development of new methods of payment for dental services. (4) Funds to enable the U. S. Public Health Service to conduct similar studies and to publish information concerning new developments in dental health and dental care.

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*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

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Secretary-Treasurer, Everett W. Bedell . . . . 1504 S. Grand Blvd., St. Louis 4, Mo.

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Treasurer, Carlos M. Paz . . . . . Av. Insurgentes 72

*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.